The Connection between Elementary School Students' Mental Health Problems, Receipt of School-Based Mental Health Services, and Socio-Emotional and Academic Outcomes

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Dissertation Abstract

Background: Nationwide, an estimated one out of eight children suffers from mental, emotional, or behavioral disorders, yet most of these children do not receive services to address these needs. For many children with mental health concerns, the public school system is a main provider of care. However, there is limited empirical research on the characteristics of children who receive mental health services in the school setting, as well as the effects of these services on children's socio-emotional and academic outcomes.

Methods: Using data from the Early Childhood Longitudinal Study-Kindergarten Class of 1998-99 (ECLS-K), this study examined the individual, family and school characteristics associated with receipt of school-based mental health (SBMH) services among elementary school children with mental health needs, and the outcomes associated with service receipt. Data were analyzed using propensity score methods and multivariate regression.

Results: Approximately one out of five children with mental health needs received SBMH services in the third grade. Study findings demonstrated that greater availability of counseling staff and high levels of mental health need were the most significant predictors of SBMH service receipt. Positive effects were not found on children's mental health or academic outcomes at two-year follow-up, likely due to limitations in the dataset.

Conclusions: Early interventions for children with mental health needs are critical for the promotion of their lifelong mental health and well-being, and many youth receive these services in the school setting. Increased availability of SBMH services would be an important strategy to reach more children with mental health needs. The literature on these services is still emerging. This dissertation provides a structure for future population-based studies to continue examining whether students in need are receiving services, how these services are best structured to achieve the most impact, and what the impacts of these services are on children's health and development.

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Chapter 1: Introduction and Dissertation Overview

Introduction

Nationwide, an estimated one out of eight children between the ages of 8 and 11 years suffers from mental, emotional, or behavioral disorders, yet most of these children do not receive services to address these needs (Farmer, Burns, Phillips, Angold, & Costello, 2003; Kataoka, Zhang, & Wells, 2002; Merikangas, He, Brody, et al., 2010). Unmet mental health needs in childhood have been linked to greater risk for suicide, poor academic performance, school dropout, substance abuse, and later unemployment (Kellam et al., 2008; Kellam et al., 1991; T.E. Moffitt, 2006). Intervening early in children's development is critical as behaviors become more difficult to change as youth progress through their life course.

For many children who receive mental health care, the public school system is their sole provider of services (Hoagwood & Johnson, 2003; Merikangas, He, Burstein, et al., 2010). However, there is limited research on the factors associated with receipt of care in the school setting, as well as the effects of school mental health services on children's subsequent health and academic outcomes. This study examined the factors associated with receipt of school-based mental health (SBMH) services among elementary school children with mental health needs, and the outcomes associated with service receipt. Specifically, the study aims were to:

1) Identify the school level characteristics associated with receipt of SBMH services among third grade students with mental health needs;
2) Identify the individual and family level characteristics associated with receipt of SBMH services among third grade students with mental health needs;
3) Examine whether children with mental health needs who receive school-based mental health services in third grade have improved socio-emotional and academic outcomes at fifth grade follow-up, compared to their peers with mental health needs who do not receive SBMH services.

This study is based on a national sample of children attending U.S. public schools. The study uses data from the Early Childhood Longitudinal Study-Kindergarten Class of 1998-99 (ECLS-K), which allows for the examination of a variety of individual, family and school level factors associated with children's health and development. Findings from this study will help to elucidate which children receive SBMH services in elementary school, and importantly, which youth need services but do not receive them; and whether there are factors that can help school staff, administrators and service providers to prioritize scarce resources to serve children most in need.

Study findings also will add to the limited literature on the effects of SBMH service receipt on children's socio-emotional and academic outcomes. In recent years, there has been an ongoing push for the provision and expansion of mental health services in schools. Most recently, as a direct result of increased school shootings nationwide, President Barack Obama called for executive and legislative actions to make schools safer and increase access to mental health services in schools. Findings from this study may help to support the case for such service expansion, as well as inform the development of school health policy and funding priorities at the school, district, state and/or national levels. These efforts can ultimately improve children's access to care and their future social, emotional and academic development.

Dissertation Overview

This dissertation begins with a review of the literature on children's mental health problems, including the magnitude, factors that contribute to their development, and how they are identified, and the literature on children's receipt of services to address these needs, particularly in the school setting. This chapter also provides an overview of the dissertation study aims and hypotheses and the conceptual framework that guided the dissertation work. The next chapter, Chapter 3, presents the research design and methods for the dissertation study. The next three chapters each focus on the aims of the dissertation study. Chapter 4 explores the school level characteristics associated with SBMH service receipt in third grade among children with mental

health needs (Aim 1). Chapter 5 examines the individual and family level characteristics associated with SBMH service receipt (Aim 2). Chapter 6 assesses fifth grade socio-emotional and academic outcomes for a matched sample of children with identified mental health needs in first grade who do and do not receive SBMH services in third grade (Aim 3). Chapter 7 concludes the dissertation with a discussion of the main findings, study strengths and limitations, and implications for future research, programs and policies.

Chapter 2: Background and Significance

Background and Significance

This chapter provides a summary of the literature on children's mental health problems and the services designed to address them, particularly in the school setting. The chapter begins with an overview of the magnitude of children's mental health problems in the U.S. While the proposed study focuses on the late elementary school years (third and fifth grade, or 8-11 year olds), much of the literature on the prevalence of children's mental health problems and service receipt has focused on a broader age range (i.e., children who are 9-17 years of age). These data are presented throughout this chapter, when data on middle childhood are not available, to provide a context for the magnitude of the problem, with the recognition that intervention in childhood could lead to a reduction in the prevalence of disorder in adolescence. Data on magnitude are followed by a description of the factors contributing to mental health problems and the long-term impacts of untreated problems. The chapter then provides a broad overview of the signs and symptoms that lead to the recognition of mental health problems in childhood, as well as how and by whom these problems are identified.

Next, a summary of the literature on children's receipt of care to address mental health needs is presented, followed by a focus on receipt of care in the school setting and the impacts of these services. In the school setting, mental health prevention efforts focus on two levels that provide a continuum of care for youth: 1) universal prevention interventions, which are proactive and offered to all students regardless of their needs or risk factors; and 2) selected and indicated (treatment) interventions, targeting youth who are at risk of developing mental health problems or those who are identified as having symptoms related to mental health disorders but do not yet meet diagnostic criteria (Domitrovich et al., 2010; Macklem, 2011). While research demonstrates interventions at each level to be effective, most prior studies concentrate on universal interventions implemented during the early elementary school years. Given that the focus of this study is on receipt of individual school mental health services, the following review focuses on

findings of treatment interventions in the elementary school setting. The chapter concludes with a summary of the contributions of the proposed study to this literature.

Magnitude of the Problem

Nationwide, it is estimated that nearly one in eight children ages eight to eleven years suffers from a mental, emotional, or behavioral disorder (Merikangas, He, Brody, et al., 2010). Furthermore, an estimated one in ten youth has serious emotional disturbances that impair their functioning at home, in school or with peers (Merikangas, He, Burstein, et al., 2010). Yet, only about one-third of youth with mental health problems receive treatment to address these needs (Farmer et al., 2003; Kataoka et al., 2002; Merikangas et al., 2011), which often persist into adolescence and adulthood with significant costs to both the individual and society.

The most common mental health disorders affecting children include externalizing and internalizing behavior disorders. The externalizing disorders receive the most attention in schools as they significantly interfere not only with children's learning, but also often with that of others in their classrooms. These disorders include oppositional defiant disorder, conduct disorders, and attention deficit hyperactivity disorder. Internalizing disorders are generally less recognized in the school setting and include anxiety and mood disorders.

Oppositional Defiant Disorder

Oppositional Defiant Disorder (ODD) is characterized by negative, hostile and defiant behavior, which often manifests in loss of temper, argumentativeness, non-compliance with rules, deliberate irritation of others, excessive anger, and vindictiveness (Barzman & Vogel, 2008). Onset usually occurs before the age of eight, with males initially at greater risk, though this difference diminishes with increasing age (Barzman & Vogel, 2008). ODD commonly coexists with conduct and attention and hyperactivity disorders, though ODD is often conceptualized as an early symptom of conduct disorder (Barzman & Vogel, 2008; Nock, Kazdin, Hiripi, & Kessler, 2007).

Conduct Disorder

Conduct disorder refers to a group of behavioral and emotional problems in children, including oppositional, defiant and antisocial behaviors, such as lying, stealing, running away, and physical violence toward humans or animals (Berkout, Young, & Gross, 2011). Boys are at greater risk than girls for conduct disorders (Nock, Kazdin, Hiripi, & Kessler, 2006). Conduct disorder is most commonly seen in late childhood or early adolescence, though it can begin at any age in early childhood (Barzman & Vogel, 2008). Childhood-onset, or diagnosis before age ten, has a worse prognosis than adolescent-onset conduct disorder (Barzman & Vogel, 2008). Furthermore, conduct disorder is often co-morbid with other disorders, including attention, substance use and mood disorders, which can further exacerbate prognosis (Barzman & Vogel, 2008; Nock et al., 2006).

Attention Disorders

Attention deficit hyperactivity disorder (ADHD) is diagnosed in children who display developmentally inappropriate levels of inattention, hyperactivity and impulsivity that lead to impairment. Children with ADHD show impairments in academic performance and social skills, and suffer from low self esteem and poor peer relationships (Faraone, 2011). These concerns persist into adolescence where delinquency becomes a concern (Faraone, 2011). Comorbidity with ADHD and other disorders is common, particularly conduct disorder, seen in 30–50% of ADHD youth, and anxiety disorders, seen in 25% of ADHD youth (Faraone, 2011). Symptoms and diagnosis of attention disorders usually emerge prior to age five (Faraone, 2011). Boys are at greater risk for ADHD, with an estimated 13% of boys nationwide having been diagnosed compared to less than six percent of girls (Centers for Disease Control and Prevention, 2013).

Anxiety Disorders

The internalizing disorders begin with less visible or outwardly disruptive behaviors, such as worry, sadness, and shyness. There are a wide variety of anxiety disorders with different

symptoms, but symptoms generally cluster around excessive, irrational fear and dread (National Institute of Mental Health, 2014). Among children, specific phobias, such as separation anxiety and social anxiety disorder, are the most prevalent, while panic disorders and obsessive-compulsive disorders tend to appear in later adolescence (Merikangas & Nakamura, 2011). Symptoms of anxiety disorders generally emerge around age six years for both boys and girls (Merikangas, He, Burstein, et al., 2010), though there is a sharper increase in prevalence among girls compared to boys from age five through adolescence (Merikangas & Nakamura, 2011). Anxiety disorders often persist across the life course, particularly the phobias, and can have significant effects on later health and productivity (Merikangas & Nakamura, 2011).

Mood Disorders

Mood disorders, which include major depressive disorder and bipolar disorder, are characterized by depressive symptoms that interfere with daily functioning, including inappropriate guilt, appetite changes, sleep disturbance, irritability, loss of interest in usual activities, and suicidal ideation. Although mood disorders tend to appear in early adolescence, they are highly comorbid with anxiety disorders, which has led to emerging research suggesting that anxiety disorders expressed early in life are part of a developmental sequence that subsequently manifests into depression (Merikangas & Nakamura, 2011). Most studies have found no sex differences in the prevalence of depression in pre-adolescents, while a few have found somewhat higher prevalence in pre-adolescent boys than girls (Merikangas & Nakamura, 2011). These sex differences shift in adolescence and adulthood, when females have higher prevalence.

The prevalence of these internalizing and externalizing disorders in children between the ages of 8-11 years is presented in the following table. ODD was not assessed in the National Health and Nutrition Examination Survey (NHANES) from which data is presented, however prevalence of ODD in a large community sample was estimated to be 2% in this age range (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003).

Table 2-1 Prevalence of 12-month Disorders in U.S. Children 8 to 11 Years of Age

	Prevalence, Estimate ± SE, %	
Disorder	**Overall Disorder**	**Disorder with Severe Impairment**
Attention deficit hyperactivity disorder	9.9 ± 1.0	9.1 ± 1.0
Conduct disorder	1.5 ± 0.3	1.2 ± 0.2
Anxiety disorder (generalized, panic disorder)	0.4 ± 0.2	0.3 ± 0.2
Mood disorder (major depression, dysthymia)	2.5 ± 0.7	1.8 ± 0.5
Any disorder	12.8 ± 1.3	11.0 ± 1.1

Source: Merikangas, K. R., He, J. P., Brody, D., Fisher, P. W., Bourdon, K., & Koretz, D. S. (2010). Prevalence and treatment of mental disorders among US children in the 2001-2004 NHANES. Pediatrics, 125(1), 75-81.

Supporting young children and their families to manage difficulties early in life can help to prevent the development of internalizing and externalizing disorders. This is important because once mental illness develops, it becomes more difficult to treat (National Institute of Mental Health, 2009). Therefore, childhood presents a critical time to identify youth at risk of developing mental health disorders and to intervene to promote a healthy course of development.

Impacts of Mental Health Problems over the Life Course

There is a substantial body of research demonstrating that unmet mental health needs in childhood negatively impact future health and productivity. Childhood problem behaviors have been associated with poor health outcomes throughout the life course, including poor academic achievement, substance abuse, delinquency and anti-social behaviors beyond adolescence into adulthood (Kellam et al., 2008; Kellam, Rebok, Ialongo, & Mayer, 1994; Kellam et al., 1991; T.E. Moffitt, 2006; Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003). These issues also create significant burdens for society. For example, in the U.S., the lifetime costs of medically-treated youth violence exceeds $14 billion annually when considering health care expenses and lost productivity (Corso, Mercy, Simon, Finkelstein, & Miller, 2007). Youth violence is also the second leading cause of death for youth ages 15-24 in the U.S. (U.S. Centers for Disease Control & Prevention, 2012). Moreover, one study estimated that preventing criminal activity in early childhood could save more than four million dollars per high risk youth over a lifetime (Cohen &

Piquero, 2009). Another study estimated the annual cost of anxiety disorders in the U.S. to be approximately $42.3 billion in the 1990s, including $23 billion in treatment costs outside of the psychiatric setting and over $4 billion in indirect workplace costs (P. E. Greenberg et al., 1999). Finally, one estimate of the societal costs of high school dropout suggested an annual loss of $36 billion in tax revenue due to lower productivity and earnings of dropouts (Tyler & Lofstrom, 2009).

Factors Contributing to Children's Mental Health Problems

There are a variety of factors that contribute to the development of children's mental health problems on the individual and family level, as well as within the broader environment.

On the individual level, children's gender affects their risk, with boys at increased risk for externalizing problems and girls at increased risk for internalizing behaviors as childhood progresses (Merikangas & Nakamura, 2011). Previous research documents variations in risk by race/ethnicity, however national community surveys reveal minor differences in the need for mental health services by children's racial/ethnic background (Merikangas, He, Burstein, et al., 2010). Cognitive and psychosocial functioning and exposure to stressful life events, such as violence, abuse, death in the family, or frequent moves, can also increase children's risk for mental health problems (Merikangas & Nakamura, 2011; National Research Council and Institute of Medicine, 2009).

Family and parent characteristics that affect children's risk include parental socioeconomic status (SES) and employment. Children from lower SES or less stably employed families, likely with less access to health insurance, can have higher risk for mental health problems, though findings are not always consistent (Merikangas & Nakamura, 2011). Problem behaviors have also been found to be more frequent for children from unmarried families than from married families, as well as those from single parent homes compared to two parent homes (Ackerman, D'Eramo, Umylny, Schultz, & Izard, 2001; Merikangas & Nakamura, 2011).

Research has also shown that maternal depression is associated with negative mental health outcomes in their offspring during childhood. In middle childhood, children of depressed mothers have significantly higher rates of mood disorders, internalizing behaviors, externalizing behaviors, and other difficulties in emotional development compared to children of non-depressed mothers (Goodman et al., 2011). By adolescence, these children also have a higher likelihood of being depressed themselves (Spence, Najman, Bor, Callaghan, & Williams, 2002). Furthermore, these children have been found to perform lower on tests of intelligence and to have lower academic performance overall (Goodman, 2007).

Exposure to poverty and its related risks put children at further risk for developing early onset problem behaviors and subsequent issues (Webster-Stratton, Jamila Reid, & Stoolmiller, 2008). For example, kindergartners from low-income families were found to have lower social competence, lower emotional self-regulation, and greater problem behaviors than their peers of higher economic backgrounds, which lead to gaps in achievement that persist into later schooling (Webster-Stratton et al., 2008; West, Denton, & Reaney, 2001).

Neighborhood and community level factors can also influence children's mental health (Evans, 2006; Leventhal & Brooks-Gunn, 2003), though perhaps one of the most significant factors is a child's school, given the significant amount of time children spend there. Research from the education field has identified a number of school level factors that affect children's academic outcomes, including the composition of the student body (e.g., the percentage of minority or low-income students), average student achievement, and school resources (Han, 2008; Ringeisen, Henderson, & Hoagwood, 2003). These same factors can also interact with and lead to mental health problems. Schools in low resource or high poverty areas are less likely to have the means to promote healthy child development and may also be in environments that expose children to additional risk factors, such as violence (National Research Council and Institute of Medicine, 2009).

It is also important to note that the risk factors for mental health problems outlined above can have cumulative effects (National Research Council and Institute of Medicine, 2009). Children with a greater number of factors are at significantly increased risk for mental health problems. Yet, similarly, children with more protective factors, such as strong family or peer relations and supportive environments, are at decreased risk.

Signs and Symptoms of Children's Mental Health Problems

Challenging behaviors are a common aspect of normative early child development. Children may test limits, have tantrums, seek attention or withdraw in new situations. However, for some children these attempts to learn the limits in their environments and cope with disappointments and frustration become extreme and persistent. In school-aged children, mental health problems are generally first recognized because of problems with peer relationships and disruptive externalizing behaviors. Internalizing behaviors are less likely to be recognized until children have extreme symptoms.

Social Skills and Peer Relations

Children's socio-emotional functioning is increasingly focused on in schools, as it has become more obvious that children's problems with peer relationships, social competence and social problem solving may indicate significant underlying problems, such as anxiety, depression, ADHD, or other learning related problems (Suldo, Gormley, DuPaul, & Anderson-Butcher, 2013). The demand for social interactions with peers greatly increases in the early school years when children's peer-directed kindness and cooperation generally increase, as do their concerns with peer acceptance (Rubin, Bukowski, & Parker, 1988). Yet, for children with deficiencies in interpreting the behavior of others and in their self-regulatory mechanisms, peer interactions are flawed by problems with impulsiveness, aggressiveness, passiveness, withdrawal and poor social problems solving (Garber, 2006; National Research Council and Institute of Medicine, 2009). For these children, their difficult peer relations are signals of their risk for later maladjustment,

including aggression or delinquency, social isolation, and dropping out of school (Hymel, Rubin, Rowden, & LeMare, 1990; Parker & Asher, 1987).

Externalizing Behaviors

About one in ten children have persistently high levels of conduct problems, including acting out, aggression, noncompliance, and other disruptive behaviors beyond what is expected from the average child (T.E. Moffitt, Caspi, Harrington, & Milne, 2002). Children with conduct problems are more likely to be rejected by peers and receive less support or instruction from their teachers (Webster-Stratton et al., 2008). As a result, these children become increasingly less engaged in school and are at greater risk for academic difficulties and future adjustment problems (Webster-Stratton et al., 2008). In school settings, most mental health support services are provided through the Individuals with Disabilities Education Act (IDEA), which is designed to ensure that all children with disabilities have access to free and appropriate public education that meets their needs (U.S. Department of Education, 2013). However, behavior problems are often not a sufficient reason for the receipt of these support services since they rely on eligibility criteria identifying disruptions in learning. This means they will likely go untreated without other resources, unless they rise to the level of disorder addressed by IDEA.

Internalizing Behaviors

Internalizing problems refer to mood or emotional concerns, such as distress, fearfulness, sadness, depressive symptoms, anxiety and social withdrawal. Internalizing behaviors in middle childhood are associated with early social challenges, including social isolation and peer rejection (Hymel et al., 1990). These behaviors may also reduce children's engagement in the classroom setting and are associated with academic underachievement (Duncan & Manguson, 2009; Kovacs & Devlin, 1998). Similar to externalizing behaviors, internalizing problems often go untreated in the school setting if schools do not have resources other than those provided through IDEA.

Identification of Children's Mental Health Needs

Identification of children's mental health needs depends largely on the awareness of adults in their lives, as well as that of the children themselves. However, identification can be complicated for many reasons (Ialongo, 2013). First, the onset of problem behaviors is often more challenging to identify in children than adults because, in children, the behaviors that might be indicative of psychopathology are often ones that most children display. Children undergo rapid changes in social, emotional and behavioral development in a very short time period, which also make it difficult to recognize what is not just part of normal development. Furthermore, children cannot always be relied on to disclose or share information about their symptoms in the same way as adults. Their recall is limited or different from adults' recall of events that are relevant to diagnosis. Thus, identification of mental health concerns is often done through assessments of teachers and caregivers who spend significant time with the children and can report on the children's behaviors and emotions. These reports also may be coupled with children's reports to obtain a comprehensive picture of children's needs. Child report is particularly important when assessing internalizing behaviors given that parents and teachers are less aware of these experiences. Research has shown that children as young as six years of age can reliably report on their distress and other experiences (Riley, 2004). Furthermore, while children and adolescents may not accurately be able to report the extent to which their behaviors are problematic to others, they are more knowledgeable about their behaviors and, given assurances of confidentiality, can often be forthcoming about their antisocial behaviors or internalizing symptoms.

There are several assessment modalities used for diagnosis and identification of children's mental health problems, including structured diagnostic interviews and clinical observations, and each modality has strengths and limitations that can affect accuracy (Ialongo, 2013). The most common modality used to identify children in need is a rating scale or checklist, which is easy to complete and can be completed by any type of rater, such as parents, teachers, clinicians and/or children. The limitation with these, as well as other modalities, is that there is

often limited agreement among different reporters, which can lead to great variation in identification rates. For example, one study found, though parents and teachers identified a similar proportion of children as having high mental health symptoms and high impairment overall, they rarely agreed in their assessments of specific children, and parent reports failed to detect half of school-aged children considered to be seriously disturbed by their teachers (Brown et al., 2006).

Research has also found that teachers are more likely to report externalizing behaviors than other problems (Stanger & Lewis, 1993), while caregivers and youth tend to report higher levels of internalizing behaviors (Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Yet, parents and youth disagree to a greater degree when reporting on internalizing versus externalizing behaviors (Kolko & Kazdin, 1993; Seiffge-Krenke & Kollmar, 1998).

Children's Receipt of Services to Address Mental Health Needs

National studies estimate that approximately 20-50% of youth who require mental health services will receive them in a given year (Kataoka et al., 2002; Merikangas, He, Brody, et al., 2010; Merikangas et al., 2011). Among 8-15 year old children in the NHANES study, youth with ADHD and conduct disorder had the greatest treatment rates (48% and 46%, respectively), followed by those with mood disorders (44%) and anxiety disorders (32%) (Merikangas, He, Brody, et al., 2010). In the Great Smoky Mountains Study, a longitudinal epidemiologic study of mental health problems and service use in a predominantly rural region of the southeastern U.S., one-third of children (34%) who were 9 to 13 years of age at enrollment received mental health services for emotional, behavioral, or substance use problems during a three year follow-up period (Farmer et al., 2003).

Research on the settings in which children receive mental health services vary, with many studies finding that most children receive services in the school setting (Green et al., 2013; Hoagwood & Erwin, 1997). In the Great Smoky Mountains Study population, services were provided most often in the education setting (24% of youth received services in this setting),

followed by specialty mental health settings (14%) and general health care settings (10%) (Farmer et al., 2003). Among this population, 60% of youth who had ever received services during their lifetime had entered the mental health service system by first receiving services from the education sector (Farmer et al., 2003).

Prior research suggests that child and family level factors associated with mental health service use include age, gender, ethnicity, socioeconomic status, parental education, marital status and rural-urban residence (Merikangas, He, Burstein, et al., 2010; Zahner & Daskalakis, 1997). Minority youth have been found to receive care at significantly lower rates than their peers, and, when they get care, the quality and frequency varies (Alegria et al., 2012; Chow, Jaffee, & Snowden, 2003). Given the nature of youth living within a family unit, their family characteristics, such as parental beliefs, family structure, income and health insurance, may also directly impact whether they have access to or use care. Lack of health insurance, in particular, will severely limit the ability to obtain services outside of school mental health clinics or the juvenile justice system (Kataoka et al., 2002).

In terms of mental health risks, children with disruptive behaviors, such as delinquency or aggression, typically receive treatment more often than those with emotional concerns, such as anxiety (Zahner & Daskalakis, 1997). Furthermore, one study found that children with higher teacher-reported externalizing behaviors in kindergarten were more likely to use mental health services through adolescence (Erath et al., 2009).

The timing of mental health service utilization is also critical given that negative developmental trajectories may become more embedded over time without appropriate intervention (M. T. Greenberg, Domitrovich, & Bumbarger, 2001). Intervention by middle childhood, if not sooner, can limit the extent to which emerging behavior problems become intensified (Dodge & Pettit, 2003).

There are many components of mental health care access that lead to barriers, such as limited providers, cost, location, lack of transportation, and inconvenient hours (Owens et al.,

2002; Samargia, Saewyc, & Elliott, 2006). These issues disproportionately affect racial minority youth who are more likely to live in low-income, under-resourced areas with limited or lower quality service availability and who may not have available transportation (Chow et al., 2003). School mental health services overcome many of these barriers by bringing services to youth in a familiar setting regardless of their ability to pay (Bringewatt & Gershoff, 2010).

School-Based Mental Health Services

As noted, for a large portion of youth who receive mental health services, the public school system is a main provider (Hoagwood & Erwin, 1997; Hoagwood & Johnson, 2003; Merikangas, He, Burstein, et al., 2010). Moreover, children who are identified as having mental health needs in school are more likely to receive services when they are offered in school than in the community (Ringeisen et al., 2003).

There have been ongoing efforts to provide and expand mental health services in schools, particularly on the national level. A Surgeon General's report (1999), the report from President George W. Bush's New Freedom Commission on Mental Health (2003), and more recently President Barack Obama's plan to protect children and communities (2013) all called for the expansion of mental health services for children in schools (President's New Freedom Commission on Mental Health, 2003; U.S. Department of Health and Human Services, 1999; U.S. Government).

Weist and Murray (2008) define school mental health as "a full continuum of mental health promotion programs and services in schools, including enhancing environments, broadly training and promoting social and emotional learning and life skills, preventing emotional and behavioral problems, identifying and intervening in these problems early on, and providing intervention for established problems" (Weist & Murray, 2008). While nearly all school districts have policies and funding allocations to provide mental health services to youth at their schools, they vary widely across schools, as do the quality and type of services provided (Weist et al., 2003). According to the Centers for Disease Control's 2012 School Health Policies and Practices

Study, three out of four districts nationwide (76%) had adopted a policy stating that student assistance programs would be offered to all students that provide services designed to assist students experiencing personal or social problems that can impact school performance, physical health, mental health, or overall well-being (U.S. Centers for Disease Control and Prevention, 2013). Yet, only one-quarter (26%) of elementary schools had adopted a policy stating that each school will have a specified ratio of counselors to students (U.S. Centers for Disease Control and Prevention, 2013).

According to a national survey of schools regarding mental health services provided in schools conducted by the Center for Mental Health Services and the Substance Abuse and Mental Health Services Administration (SAMHSA), nearly all schools nationwide (97%) reported having at least one staff member whose responsibilities included providing mental health services to students; most commonly school counselors, nurses, school psychologists, and social workers (Teich, Robinson, & Weist, 2008). In most schools nationwide (87%), all students were eligible to receive mental health services, while 10% required that students have an Individualized Education Plan (IEP), indicating special education status, to be eligible for services. The main Federal sources of funding for school mental health services were the Individuals with Disabilities Education Act, reported by 63% of districts; state special education funds (55%); local funds (49%); state general funds (41%); and Medicaid (38%), which funded services to low income students (Teich et al., 2008). The average ratio of mental health staff to students was approximately one staff member per 500 students; although this varied by urbanicity, with urban schools having a smaller ratio of providers to students (0.8 urban compared to 1.3 rural per 500 students) (Teich et al., 2008). More recently, the Department of Education's Schools and Staffing Survey found that, in elementary schools with at least one full- or part-time counselor, psychologist or social worker, there were 290 students per full-time equivalent on average (National Center for Education Statistics, 2012). However, when staffing was examined for each role separately, this ranged from 440 students per FTE counselor to 620 students per social

worker to 740 students per psychologist, possibly suggesting that there is disproportionate staffing across individual schools, with some having access to greater FTE and/or staffing types than others.

Consistent with other national estimates, the SAMHSA study also reported that approximately 20% of students had received school mental health services in the previous year (Teich et al., 2008). In terms of services offered, the majority of schools (80%) offered assessment for mental health problems, behavioral management consultation, crisis intervention and referrals to specialized programs; over two-thirds provided individual mental health services, case management and group mental health services; more than half provided family support services (58%); and one-third (33%) provided medications or medication management. The top problems addressed by mental health programs in elementary schools included social, interpersonal, or family issues; aggression or disruptive behaviors; behavioral problems associated with neurological disorders; adjustment issues; depression; and anxiety (Teich et al., 2008).

One of the more attractive features of school mental health programs is that they have the ability to reach all youth in need of services regardless of ethnicity or socio-economic status, given that services are provided at school, where children already are, and with no cost to families, overcoming traditional barriers to accessing care. One study based on a nationally representative school-based sample of adolescents found no racial/ethnic differences in school-based mental health service use compared to significant racial/ethnic differences in clinic-based service use outside of the school setting among youth with high mental health needs (Cummings & Druss, 2011).

There is an emerging body of research examining the impacts of school mental health services on youth's internalizing and externalizing behaviors (Hoagwood et al., 2007). Yet, it is important to note that many of these studies are uncontrolled studies. In one study of elementary school children experiencing severe emotional and behavioral difficulties who received school

mental health services, statistically significant reductions were found in conduct disordered behavior, attention deficit-hyperactivity, and depressive symptomatology approximately one year later (Hussey & Guo, 2003). Another study of children ages 5 to 18 years with severe emotional disorders receiving school mental health services found that 51% of the study participants had reduced symptoms at 9-month follow-up and 28% had symptoms that returned to limits below clinical levels of disorder (Robinson & Rapport, 2002).

Yet, the majority of studies examining the impacts of school mental health programs do not include an examination of academic outcomes, and among those that do, most have found mixed results (Becker, Brandt, Stephan, & Chorpita, 2014a; Bruns, Moore, Stephan, Pruitt, & Weist, 2005; Lyon, Borntrager, Nakamura, & Higa-McMillan, 2013). In their review of empirically-based studies of school-based mental health interventions, Hoagwood and colleagues (2007) identified only 64 out of more than 2,000 articles published between 1990 and 2006 with strong methodological rigor, six of which were treatment programs in elementary schools that examined both mental health and educational outcomes (Hoagwood et al., 2007). While all six studies found positive effects in mental health outcomes, none demonstrated effects on educational outcomes. One more recent study of school mental health programs offered in elementary schools found decreased suspensions and improved attendance among children who received services compared to a matched group of students who did not receive services (Ballard, Sander, & Klimes-Dougan, 2014). Another recent study of children aged 6 to 17 years who were enrolled in school mental health services found very small changes in attendance and suspensions and slight improvements in grade promotion (Kang-Yi, Mandell, & Hadley, 2013).

Despite these findings suggesting that school mental health programs have the potential to affect academic and mental health outcomes, the small number of studies and their methodological challenges, including lack of well matched comparison groups and limited follow-up periods, limit their generalizability. Furthermore, the majority of these studies were not population-based but used convenience samples.

Implications of this Study

The research on school mental health services is expanding but still limited. In the recent decades, there has been an increasing understanding of which students are reached by these programs, what components have the most impacts, and what these impacts are on students' academic and socio-emotional outcomes. Additional and more rigorous research is needed to better understand these issues, particularly given the recent heightened attention on the Federal level in the U.S. Studies of these programs on the national level are particularly lacking in the existing literature.

In one study using the national ECLS-K study data, Reback (2010) examined the characteristics of children who received school counseling services in the third grade (Reback, 2010). The study found that approximately 13% of U.S. public school students received school counseling services, and children who were male, non-Asian, lived with one parent, or had parents who recently became divorced or separated were more likely to receive counseling. As part of this study, Reback also conducted a separate survey with state administrators about elementary school counselor finance policies. After controlling for children's academic indicators in kindergarten, the study found that greater availability of school-site elementary counseling services was associated with higher test scores and improved mental health and behavior among third grade students.

This study builds on Reback's prior research. However, while Reback's study examined the characteristics of children who had received counseling services in the third grade compared to their peers in the general population, this study will focus on identifying characteristics associated with service receipt among only those children with mental health needs. This will help identify which students with a demonstrated need for services are not receiving them. This dissertation study further extends Reback's research by determining the changes in mental health and functioning associated with service receipt at fifth grade follow-up. Findings of this study

will have implications for the public health and education fields to help tailor programming for students with mental health needs.

Theory and previous research suggest that problem behaviors that emerge early in childhood and persist are more damaging than those that emerge later or are transitory (Caspi, Bem, & Elder, 1989; Heckman, 2006; T.E. Moffitt, 1993). Schools play a critical role in the early detection of mental health problems since children spend a large amount time in these environments. Given the importance of prevention and intervention efforts targeting early stages of the life course, this study can help to inform future school-based mental health programming and policy efforts that target youth in childhood.

Study Aims and Hypotheses

The aims for this dissertation, with relevant hypotheses, are as follows:

Aim 1: Identify the school level characteristics associated with receipt of school-based mental health services among third grade students with mental health needs.

- Hypothesis 1.1: Children in schools with higher resources (i.e., more counseling staff, smaller class sizes) will be more likely to receive mental health services than those in schools with fewer such resources.
- Hypothesis 1.2: Children in schools with a higher proportion of low-income students (based on percentage of those eligible for free lunch and Title 1 status) will be less likely to receive mental health services than those in schools with a lower proportion.

Aim 1 Rationale: In a national survey, one of the most frequently reported barriers to providing school mental health services included lack of school resources (Teich et al., 2008). Thus, it is important to further examine how this factor is related to children's receipt of services. It is hypothesized that schools with lower resources and higher needs compositions will have a lower likelihood of providing services to students in need. This is important given that students in high risk environments are often at greater risk for emotional and academic problems. The significant school level factors identified through this analysis can then be accounted for in the subsequent analyses that examine the individual and family level factors associated with children's service receipt.

Aim 2: Identify the individual and family level characteristics associated with receipt of school-based mental health services among third grade students with mental health needs.

- Hypothesis 2.1: There will be demographic differences (i.e., gender, SES, family type) between children who receive school-based mental health services and those who do not.

- Hypothesis 2.2: There will be differences in receipt of services based on children's signs of mental health need (i.e., problem behavior or reporter type).

Aim 2 Rationale: There is extensive literature documenting the individual and family level characteristics that are associated with children's receipt of mental health services, in general. Specifically, males and those with externalizing behaviors are more likely to receive services in most settings. Thus, it is hypothesized that these factors will affect student's receipt of school mental health services. This analysis will add to the limited literature on which characteristics are associated with receipt of care in the school setting among youth with mental health needs.

Aim 3: Examine whether youth with mental health needs who receive school-based mental health services in third grade have improved socio-emotional and academic outcomes at fifth grade follow-up, compared to their peers with mental health needs who do not receive school-based mental health services.

- Hypothesis 3.1: Among children with similar levels of mental health needs, those who receive school mental health services in third grade will have better socio-emotional outcomes (i.e., lower teacher reported internalizing and externalizing behaviors) in fifth grade compared to those who do not receive these services.
- Hypothesis 3.2: Among children with similar levels of mental health needs, there will be no differences in academic outcomes (i.e., attendance, math and reading achievement) in fifth grade between those who do and do not receive school mental health services in third grade.

Aim 3 Rationale: Based on previous literature, receipt of school mental health services is strongly associated with gains in socio-emotional indicators, however findings on the impacts on academic performance have been mixed. This is likely due to the fact that children who receive services tend to have higher needs and, thus, changes in socio-emotional indicators are more likely to be observed with targeted treatment services over a short time period. In contrast, changes in academic behaviors are less likely to be observed because school mental health services often do

not have an academic focus, and the indirect impacts of improved socio-emotional behavior on academic performance would likely require a longer follow-up period. Thus, it is hypothesized that changes will be seen in socio-emotional outcomes after two years between children who do and do not receive services, but there will be no differences in academic outcomes.

Theory and Conceptual Framework

School-based and child health promotion interventions generally are grounded in the socio-ecological theory of development, which emphasizes the contributions and interactions of the child with multiple environmental levels that influence growth and development, including individual, familial, peer, school and community level factors (Bronfenbrenner & Morris, 2006).

Bronfenbrenner's earlier version of the socio-ecological model provides a framework through which the factors that contribute to children's mental health and receipt of mental health services can be examined. This model maintains that everything intrinsic to a child and her environment affects how she grows and develops. At the core of this model is the child herself, which includes the attributes within the child that elicit specific responses from social contexts (i.e., gender, social skills, race). Outside of the individual child, there are four levels of the child's environment that influence development, including the microsystem, the mesosystem, the exosystem and the macrosystem (Bronfenbrenner & Morris, 2006). The microsystem is the most proximal, and in this theory, the most powerful, involving interactions with family, peers and teachers in the home, school and the neighborhood. In general, the more positive and nurturing these proximal processes are, the more positively they will impact her development. The mesosystem comprises connections between the microsystem components, or rather is a system of microsystems. Mesosystem factors that contribute to mental health can include interactions between families and teachers or clinicians, which would determine how much of a role these individuals play in the child's development. The child's mesosystem depends greatly on the factors that comprise her microsystems and how she interacts with these systems based on her individual characteristics, such as temperament. The mesosystem is also affected by the child's exosystem and macrosystem, in that norms and laws set the stage for how the microsystem and mesosystem develop. The child's exosystem includes the other settings that the child herself may not be part of directly but that still have a large impact on her, such as parents' workplaces, which

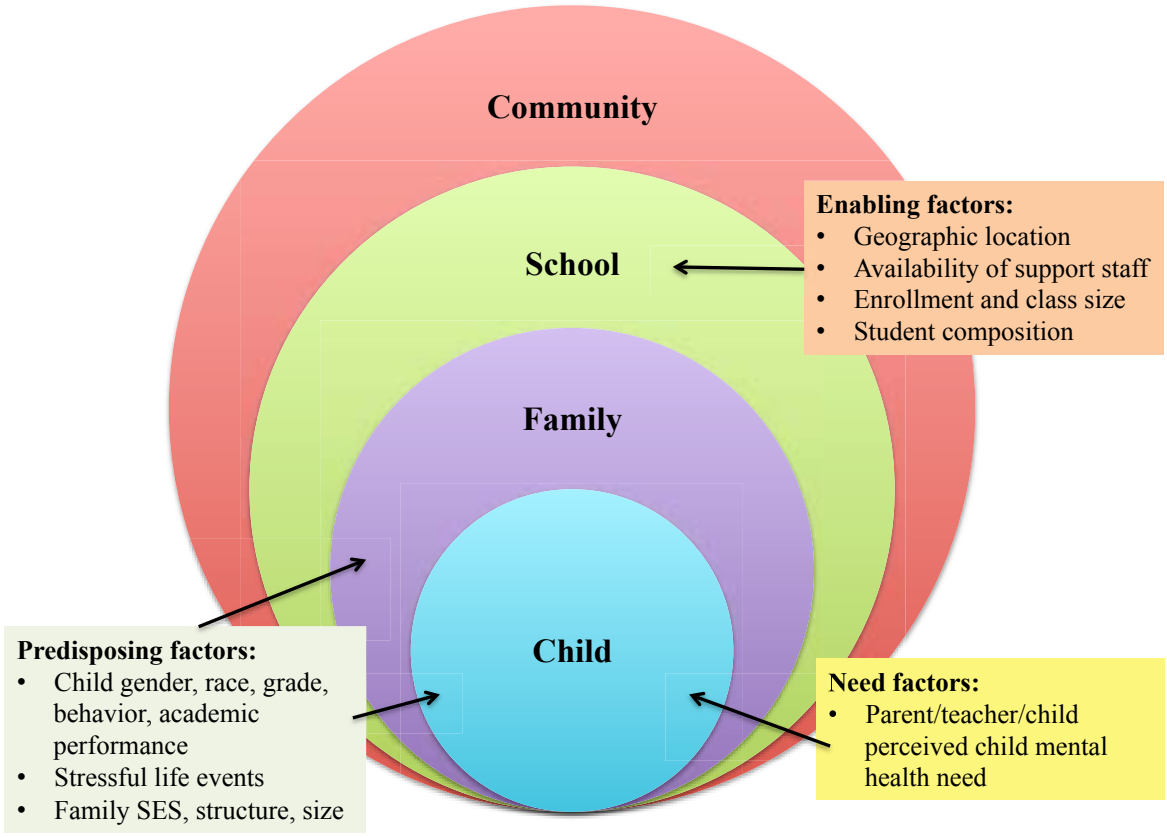
affects opportunities for parental supervision and involvement, as well as access to insurance and parental stress. Local support for services that impact child development, such as school or community programs that provide support services for youth, are other contextual factors that can help to support children's healthy development (Bronfenbrenner & Morris, 2006).

Understanding the factors that impact health services utilization is also enhanced with the application of Andersen's Behavioral Model of Health Services Use (Aday & Andersen, 1974). This model, in its early stages, distinguishes three types of individual and contextual determinants of health services use: 1) predisposing factors, 2) enabling factors; and 3) service need factors (R.M. Andersen, 2008). Individual predisposing factors include those characteristics that exist prior to the experience of a health services need, including demographic characteristics, ethnicity, family social status and relationships, and health beliefs. Enabling factors include those conditions that allow an individual to access services, such as ability to pay, transportation and availability of services. Need factors can include the individual's perceived need for services, as well as the evaluated need based on a professional's assessment. This model can be applied to children's mental health service use, for example, by including a teacher's recognition of children's problem behaviors as need factors. Enabling factors include availability of counseling services and resources in the schools and predisposing factors include child gender and parental mental health status.

In order to broadly represent the complex dynamics by which children develop mental health problems in the context of their families, schools and broader environments and the ways in which these environments recognize and respond to their needs for mental health services, this study incorporates both Bronfenbrenner's socio-ecological model and Andersen's health utilization model. It will examine the factors in the child's microsystem, including individual and family characteristics and school mental health services and resource availability, to determine how they are associated with the receipt of school mental health services and children's health outcomes. This conceptual framework is reflected in Figure 2-1 with the various systems

affecting children in each concentric circle and the enabling, predisposing and need factors identified within each of these levels. While community resources are included in this figure and play an important role in child development, they will not be examined through this study.

Figure 2-1 Conceptual Framework



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Chapter 3: Research Design and Methods

This study uses data from a national prospective cohort study to examine predictors of SBMH service receipt (aims 1 and 2) and related child health outcomes after SBMH service receipt (aim 3). For study aims 1 and 2, cross-sectional data were used to assess school, individual and family level factors associated with SBMH receipt in the third grade. Aim 3 used data from three waves of data collection to examine the relationship between SBMH service receipt in third graders with mental health problems and their fifth grade socio-emotional and academic outcomes.

The following chapter provides an overview of the research design and methods. It begins with a description of the dissertation data source, the *Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K),* and the ECLS-K's study design, followed by a description of the dissertation study sample, methods and analyses.

Data Source: *Early Childhood Longitudinal Study, Kindergarten*

Data for this study came from the *Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K),* which was conducted by Westat and developed under the sponsorship of the U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (NCES). The ECLS-K followed a nationally representative cohort of children from kindergarten into middle school. Baseline data were collected during the 1998–99 school year from 21,260 kindergartners in public and private schools (Tourangeau et al., 2009), though only public school data was used for this study.

Data were collected on children's cognitive, social, emotional, and physical development, as well as their home, school and classroom environments, classroom curriculum, and teacher qualifications. The longitudinal design enabled researchers to study how these factors were associated with school performance, as well as how children's early experiences related to their later development and learning. The ECLS-K obtained data from multiple sources and using

multiple methods, including interviews with parents, self-administered questionnaires from principals and teachers, student records abstracts, and direct child assessments and questionnaires. Seven waves of data were collected from the sample in the fall and the spring of kindergarten (1998-99), the fall and spring of 1st grade (1999-2000), the spring of third grade (2002), the spring of fifth grade (2004), and the spring of 8th grade (2007).

The ECLS-K data were released in public use and restricted data files. This study utilized the public data file, in which all data were de-identified. This source of data was selected for this study because it included a national sample of children in the U.S. attending public schools with data from multiple sources on children's health and academic indicators and use of services, as well as an extensive set of covariates.

ECLS-K Data Collection – Timing and Procedures

This study used data collected in the spring of the first (2000), third (2002), and fifth grade (2004) years from multiple sources, including child assessments and questionnaires; parent interviews; self-administered teacher questionnaires and assessments of children in their classrooms; self-administered school administrator questionnaires; and school record abstract forms.

Child Level Assessments and Questionnaires

Computer-assisted interviews (CAI), conducted by trained assessors who visited sampled children's schools, were used to collect data for child assessments. Specifically, in the first, third and fifth grades, children completed untimed, direct cognitive assessment batteries designed to assess their academic achievement in the areas of math and reading. In the third and fifth grades, children also completed a self-report questionnaire that included questions about school experiences, participation in activities, and social-emotional development and difficulties.

Parent Interviews

CAI's were also used to collect data from parents/caregivers during each survey administration on demographic characteristics, such as ethnicity and family structure, parental

involvement in school and at home, and parent reported concerns with their child's and their own emotional health. Data from the first and third grade administrations were used for this study. Interviews were primarily conducted in English, with resources available to conduct them in other languages when needed.[1] Trained interviewers phoned parents at their homes to conduct the 45-50 minute interview with approximately 500 questions. Interviews were conducted in person if parents did not have telephones (this involved 2% of the sample in third grade).

Teacher and School Administrator Questionnaires and School Record Abstract Form

Teachers provided information on school and classroom characteristics through self-administered questionnaires. Teachers also completed individual assessments for each child in the study on children's academic, social and behavioral characteristics. Each sampled child's regular classroom teacher (hereafter referred to as "primary teacher") completed the survey in first and third grades. Children's reading teachers completed the survey in fifth grade, along with either their math or science teachers, though data from this study came from reading teachers' assessments (primary teacher).

The principal or administrator of the school attended by the sampled child completed the school administrator questionnaire. This survey gathered information on school demographic characteristics, programs offered, and policies. School staff completed the student records abstract form for each sampled child, which included information about the child's attendance in fifth grade.

ECLS-K Instruments Used in This Dissertation

Within the child and teacher assessments/questionnaires, three standardized instruments were used to collect information on children's academic and socio-emotional behaviors, all of which were used for this study: 1) the Teacher Social Rating Scale (SRS); 2) the Child Self-Description Questionnaire (SDQ); and 3) Child Cognitive Assessments. The same instruments

[1] Data on how many other languages and how often parent interviews were conducted in other languages were not found in the ECLS-K manuals.

were used in the third and fifth grade survey administrations. The first grade administration did not include the Child SDQ and the Teacher SRS was slightly different, as described below.

Teacher Social Rating Scale (SRS)

In the first and third grades, each sampled child's regular teacher completed a questionnaire rating the child's social development. In the fifth grade, the child's reading teacher completed this questionnaire.

In the first grade administration, there were five scales in total, however the inter-correlations among the scales were high and ECLS-K researchers warned of issues with multi-collinearity if all the scales were entered into the same analyses (Tourangeau et al., 2002). Therefore, only the externalizing and internalizing problem behavior scales were used in aim 3 of this study to define the sample of children with mental health needs. In the third and fifth grade administrations, there were five scales in total, however two of these scales (self-control and interpersonal skills) were combined by the ECLS-K researchers to form the peer relations scale. The peer relations scale, along with the internalizing and externalizing problem behaviors scales, were used for the first and second papers in this study. All scale items were rated on a frequency scale of 1 (never), 2 (sometimes), 3 (often), and 4 (very often).[2] The scales assessed the following information:

- **Externalizing Problem Behavior** scale (administered in first, third and fifth grade) had six items that assessed acting out behaviors, i.e., the frequency with which the child argues, fights, gets angry, acts impulsively, disturbs ongoing activities, and talks during quiet study time.
- **Internalizing Problem Behavior** scale (administered in first, third and fifth grade) had four items and assessed the presence of anxiety, loneliness, low self-esteem, and sadness.

[2] The "Approaches to Learning" scale, which measures behaviors that affect the ease with which children can benefit from the learning environment, was not used in this study, except in the third aim when identifying the study sample based on baseline pretreatment characteristics.

- **Peer Relations** scale (administered in third and fifth grade) had nine items and represented self-control (i.e., temper control) and interpersonal skills (i.e., showing sensitivity) that are important in establishing and maintaining peer relationships.

These measures were adapted from the *Social Skills Rating Scale: Elementary Scale A* instrument (Gresham & Elliott, 1990). The split-half reliability for the teacher SRS scores were: externalizing problem behaviors – 0.89; internalizing problem behaviors – 0.76; and peer relations – 0.92 (National Center for Education Statistics).

Child Self-Description Questionnaire (SDQ)

In the third and fifth grades, sampled children completed the ECLS-K developed SDQ, a 42-item survey that assessed how children thought and felt about themselves socially and academically. Children rated their perceptions of themselves on each item on a four-point scale: 1 (not at all true), 2 (a little bit true), 3 (mostly true), or 4 (very true). All items were weighted equally. The 42 items factored into six scales. Three of these scales that pertain to socio-emotional development were used for this study[3]:

- **SDQ Peer** scale, which included six items about how easily the child made friends, got along with peers, and thought about his/her popularity. Lower scores on this scale indicated a problem.
- **SDQ Anger/Distractibility (externalizing behaviors)** scale, which included six items about externalizing problem behaviors, including fighting and arguing with peers, disturbing others, and problems with distractibility. Higher scores on this scale indicate more problems.
- **SDQ Sad/Lonely/Anxious (internalizing behaviors)** scale, included seven items about internalizing problem behaviors, including feeling sad, lonely and ashamed, and worrying about school and friendships. Higher scores on this scale indicated a problem.

[3] The other three scales (SDQ Reading, SDQ Mathematics, and SDQ School) assessed children's perceptions of competence and their interest in school and are therefore unrelated to the present study.

The items on the peer scale were adapted with permission from the *Self-Description Questionnaire I* (Marsh, 1992) and the items in the two problem behavior scales were developed specifically for the ECLS-K. Mean scores for each scale were provided for each child in the ECLS-K dataset. The scale reliabilities (alpha coefficients) were relatively high: peer scale – 0.79; externalizing problems – 0.77; and internalizing problems – 0.81 (National Center for Education Statistics).

Child Cognitive Assessments

The direct child cognitive assessments in first, third and fifth grade included reading and mathematics domains.[4] The students completed workbooks with open-ended mathematics and reading questions. Trained assessors read all questions aloud. Direct cognitive assessments were designed to assess children's academic achievement and to provide a means of measuring growth in cognitive domains. Test items were developed by education and child development experts and reviewed by elementary school curriculum specialists for appropriateness of content and difficulty. ECLS-K researchers determined the content validity of these assessments by comparing the results with scores on the Woodcock-McGrew-Werder Mini-Battery of Achievement that was also administered during pilot testing. Additional information about cognitive assessment batteries can be found in corresponding psychometric reports (Tourangeau et al., 2009).

Students' performance results on these batteries were provided in several score formats in the ECLS-K dataset. For purposes of this study, the overall math and reading Item Response Theory (IRT) scores were used. The IRT scale scores can be used as longitudinal measures of overall growth and to identify cross-sectional differences among subgroups in overall achievement. The ECLS-K researchers also recommended use of the IRT scores to assess changes in children's performance over time.

[4] A science domain was included in third and fifth grade administrations, and a social studies domain was added in fifth grade, however those domains are not included in this study.

ECSL-K Study Sample

The overall ECLS-K sample was selected using a multistage probability sample design. The primary sampling units were counties or groups of counties, 100 of which were identified. The second sampling level included public and private schools offering kindergarten programs within the sampled counties (953 public and 460 private), with the probability of school selection proportional to a weighted measure of size based on the number of kindergarteners enrolled. Schools were sorted within each stratum to achieve sample representation across other characteristics. Children of kindergarten age within schools were the third sampling unit and were selected using equal probability systematic sampling within each stratum, with Asian and Pacific Islanders oversampled. The ECLS-K researchers provided weights to adjust for unequal probabilities of selection at each sampling stage, as well as loss to follow-up. Weighting was necessary to prevent biased estimates and make it possible to generate population-level estimates.

Parent contact information was obtained from the school for sampled children to then obtain parental consent for study participation. In the base year (1998/99), there were 17,777 children in public schools who participated in the ECLS-K study. In the first grade administration, there were 14,248 child public school participants. In the third grade administration, there were 13,166 child participants (though only 11,961 with teacher, child and parent data), and in fifth grade the number of child participants decreased to 9,567 public school students. The primary reason for this decrease was because four groups of children from the base year were not followed in the fifth grade administration, including: 1) children who became ineligible in an earlier round (because they died or moved out of the country); 2) children who were dropped from the sample in previous rounds due to switching schools and not being sub-sampled for follow-up; 3) children whose parents declined to participate in data collection rounds since the base year; and 4) eligible children who were missing first and third-grade data.

Dissertation Study Sample Selection

For the first two aims of this study, data from the third grade ECLS-K administration were used. The sample included all third grade child level participants in public schools whose teachers responded to the question about whether the child received school-based mental health services. Children whose teachers did not respond to the receipt of school mental health services question, or responded that the program was not offered, were excluded since that was the primary variable of interest.

The sample was further reduced to include only those children who were identified as having a mental health need in third grade, either based on child self-report or teacher-report. Due to the variation in assessments from each reporter (i.e., teachers completed the SRS and children the SDQ), there was no standardized measure that could be used across reporters to identify children for the sample, thus "mental health need" was operationalized based on separate scales from the teacher and child questionnaires. Specifically, mental health need was operationalized as whether the child's primary teacher or child identified concerns with internalizing behaviors, externalizing behaviors, or peer relations in the SRS and/or SDQ scales. Children with missing data on these six sub-scales were ineligible for the study.

In order to identify this sample of children with mental health needs, exploratory analysis was conducted. This analysis involved an examination of the proportions of students with the highest problem scale scores to identify a sample that closely resembled epidemiological estimates in other published studies with regard to demographic and mental health characteristics of children in this age group with mental health needs. Exploratory analysis with various cutoffs, for example, those with one mental health problem behavior in the top 15% or those with two or more problem behaviors in the top 5%, led to incorrect estimates of children with mental health need. The former identified nearly 50% of the sample as having mental health need, and the latter less than 5%. Appendix 1 provides an overview of the results of the exploratory analysis.

Based on the results of the exploratory analysis, students who were in the top (worst) 15% of scores on any two or more of these six sub-scales were considered to have a potential mental health need. This was consistent with the national estimate that approximately one of out eight children in this age group has emotional, mental or behavioral disorders (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Merikangas, He, Brody, et al., 2010). In a study similar to this study of school based mental health services that examined predictors of recurring psychopathology from kindergarten to fifth grade, the authors also considered children as displaying high levels of problem behaviors if their scores on the ECLS-K externalizing or internalizing problem behavior subscales were within the highest 15% of scores (Morgan, Farkas, & Wu, 2009).

In the third grade ECLS-K parent interviews, respondents were asked whether they felt their children had emotional concerns compared to their peers. However, the presence of emotional concerns was answered as "yes/no" rather than on a scale similar to the SDQ and SRS measures. Therefore, parent reported concerns were not used to identify the sample of children with mental health needs. However, parent reported concerns were used as a covariate in data analyses to determine its association with receipt of services.

For aim 3, the sample was selected using a similar process as that described for aims 1 and 2. However, children with mental health need were identified as those with scores in the top (worst) 15% of teacher reported internalizing and externalizing behaviors in the first grade. First grade data was used to identify a sample of children prior to receiving treatment in the third grade to avoid issues of timing of the intervention receipt and potential biases on mental health indicators that were assessed in the third grade. Child self-report data on mental health indicators were not collected in the first grade and thus could not be used to identify children with mental health needs for the sample. Data were collected from parents in the first grade on children's socio-emotional indicators, however these data were not used to identify the sample with need because follow-up data was not collected from parents in the third or fifth grades. Parent reports

were included as covariates in the analyses for aim 3.

Inclusion/Exclusion Criteria

For aims 1 and 2, the sample only included children attending public schools, given that private school systems have different policies and protocols related to provision of mental health services. Students who were not in the third grade and were missing data on any of the six mental health need measurement scales were also excluded. Additionally, children whose teachers did not respond to the receipt of school mental health services question, or responded that the program was not offered, were excluded.

For aim 1, children whose principals indicated that there were no psychological or counseling staff at their school were excluded from the study (n=215), given the importance of this variable to the research question. Figure 3.1 depicts how the study sample was selected for aim 1.

For aim 2, children whose parents did not complete a parent interview were excluded from the study sample (n=294), given the importance of information from this data source to the analysis. (Children whose principals indicated that there were no psychological or counseling staff at their school were included in the sample for aim 2). Figure 3.2 depicts how the study sample was selected for aim 2.

For aim 3, the sample only included children attending public schools in first and third grade. Children who were not in the first grade during the first grade survey administration or the third grade during the third grade administration were excluded. Additionally, children whose teachers did not respond to the receipt of school mental health services question in third grade, or responded that the program was not offered, were excluded. As seen in Figure 3.3, children were also excluded from the sample sequentially if they had missing data on 5th grade mental health outcomes, since these were the main dependent variables of interest; 1st grade parent questionnaires, since data from this source was needed to match children in the treatment and control groups on baseline characteristics; 1st grade teacher report on externalizing and

internalizing behaviors, since these variables were used to identify the sample with mental health needs pre-treatment; and strata and primary sampling unit information, since these variables were necessary to properly weight the sample back to the target population.

Figure 3-1 Sample Selection Flow Diagram for Aim 1

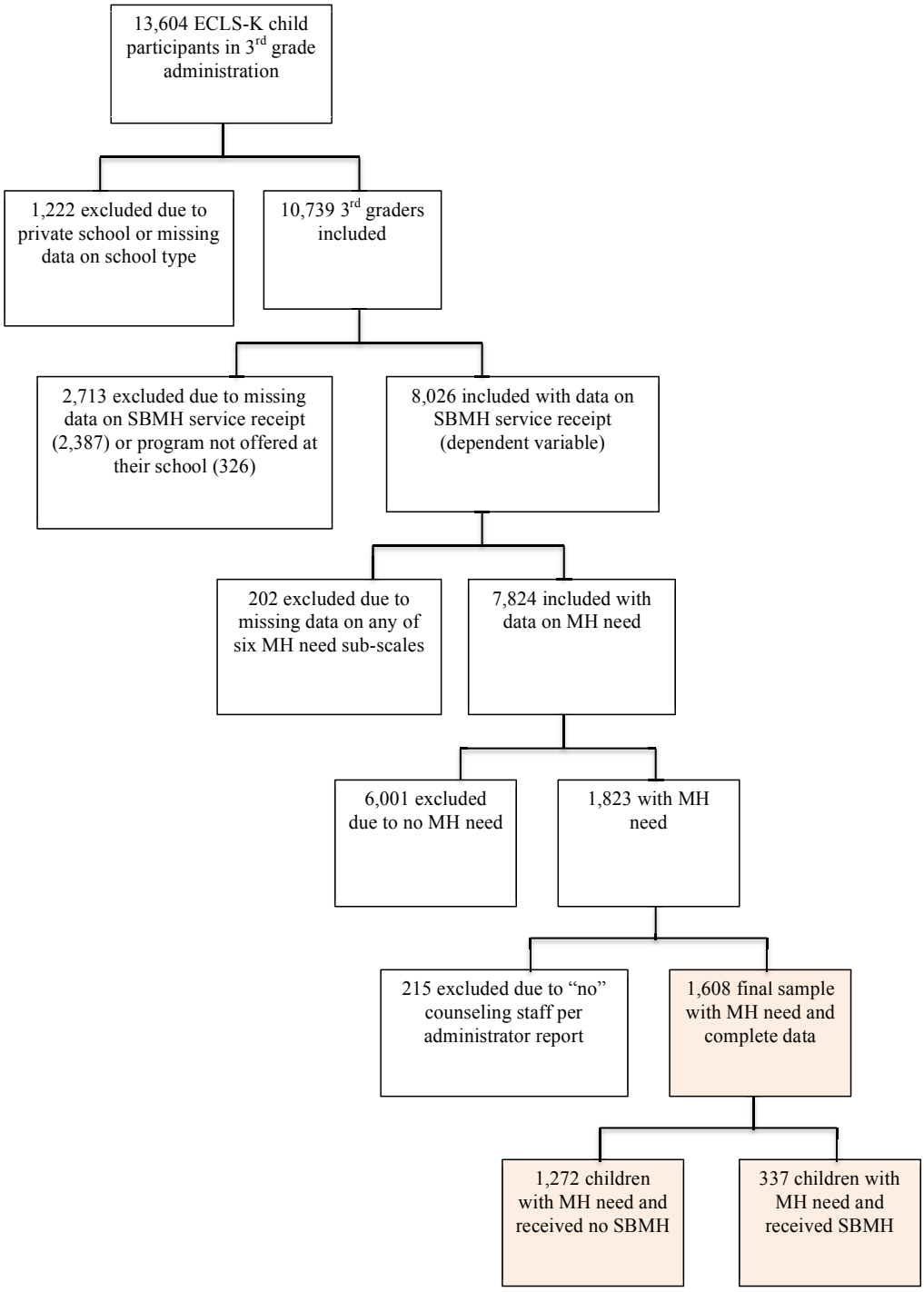


Figure 3-2 Sample Selection Flow Diagram for Aim 2

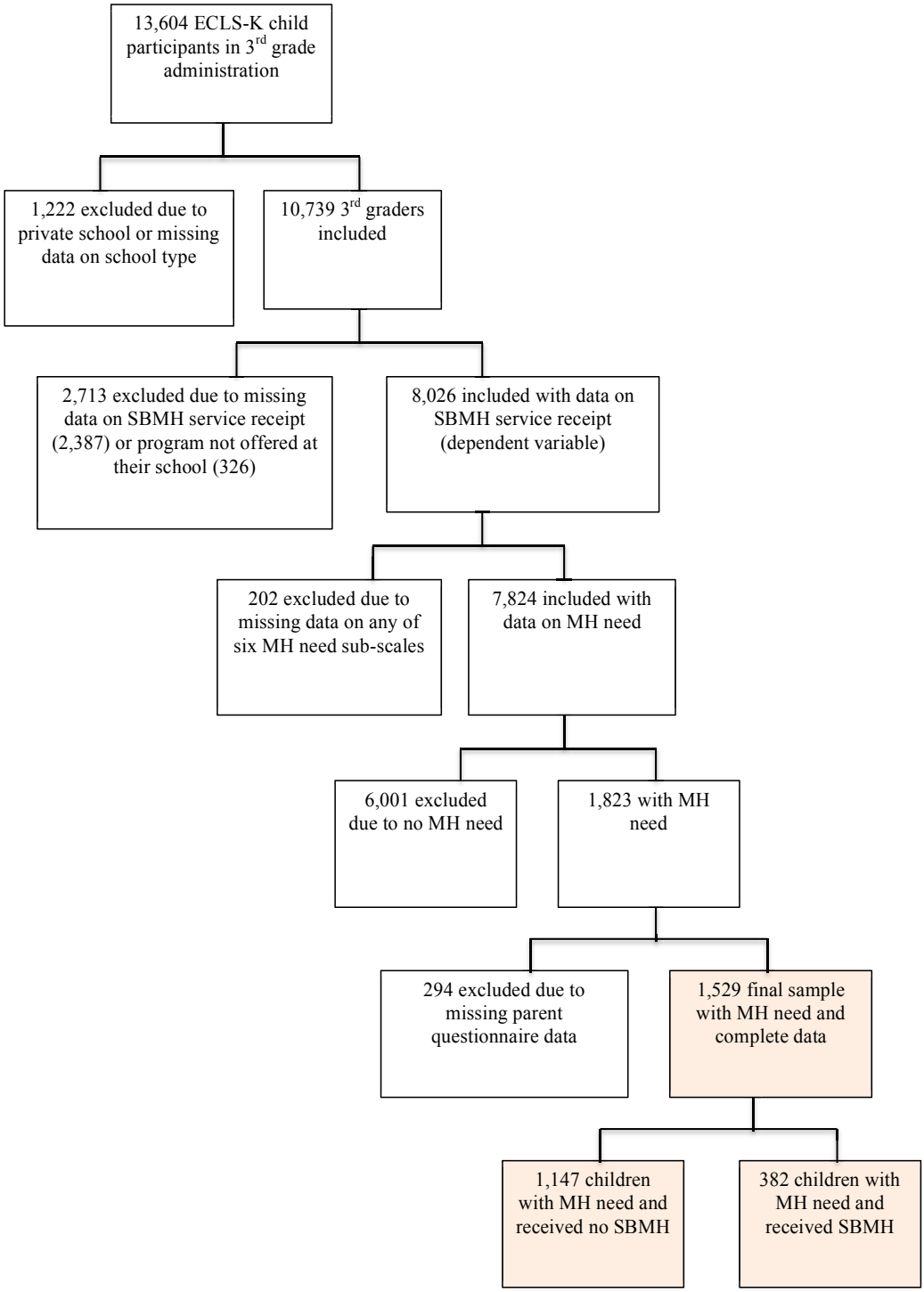
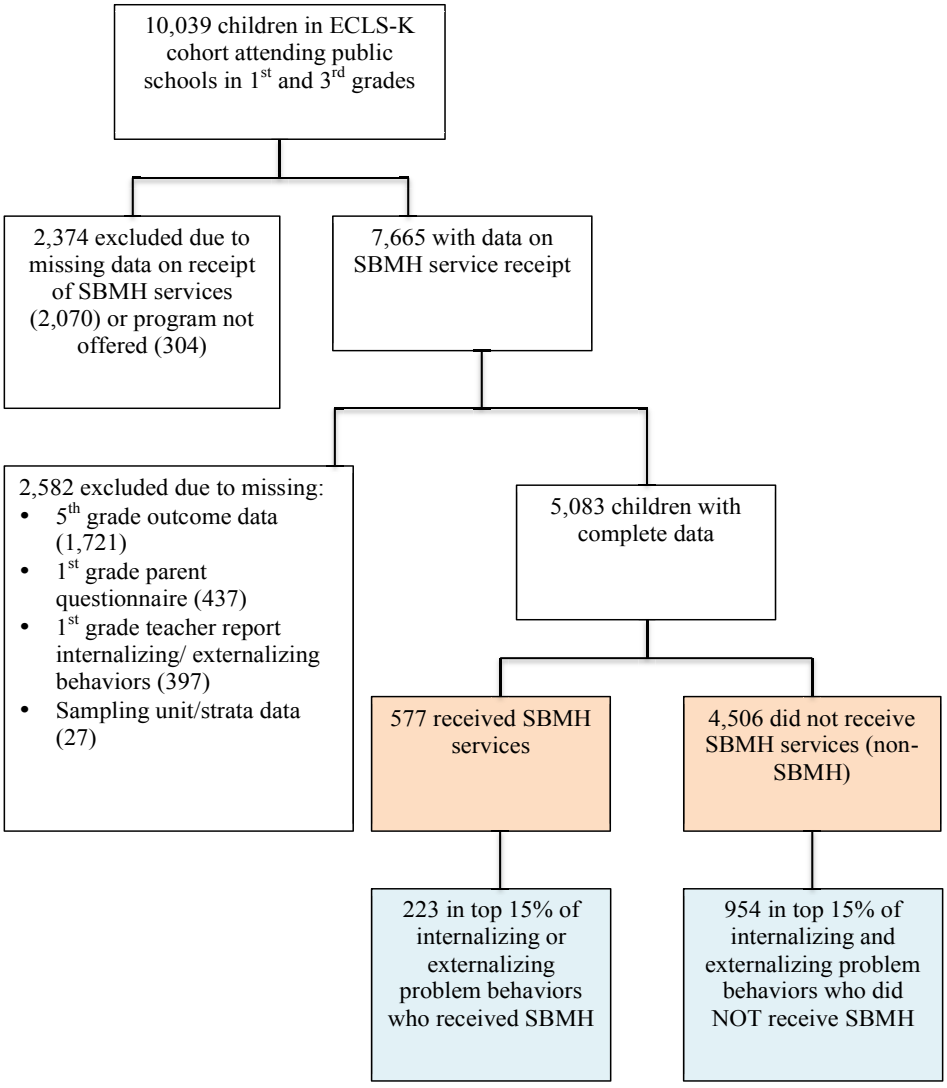


Figure 3-3 Sample Selection Flow Diagram for Aim 3



Power Analysis

The Fleiss formula for sample size estimation was used in Stata to determine the necessary sample size to detect a true difference in changes in students' academic and socio-emotional characteristics, based on an alpha of 0.05 and a power of 0.80 (Fleiss, 1981). To detect a possible effect size of 0.20, a minimum sample size of 394 subjects per group is needed with sufficient power (>80%) to detect a true difference. Based on the weighted ECLS-K population sizes, this study will meet the criteria for detecting an effect of 0.20 standard deviation difference between the groups, however un-weighted samples may not have sufficient power.

Variables of Interest

Appendix 2 lists all variables that were used in this study, including a description of how each variable was operationalized. These variables are described in more detail below.

Primary Dependent Variable (Aims 1 and 2)

Aims 1 and 2 explored the independent individual, family and school level characteristics that were associated with children's receipt of school mental health services. Thus, receipt of services was the primary dependent variable for these analyses. Receipt of mental health services was based on teachers' responses to the question, "*Does this child receive instruction and/or related services in any of the following types of programs in your school during the school day?... Individual or group counseling from a trained professional."* Responses were coded as a dichotomous variable (0=no, 1=yes), with those who responded "program not offered" or with missing data excluded from the sample.

Primary Dependent Variables (Aim 3)

Socio-Emotional Indicators

Children's fifth grade mean scores on teacher SRS externalizing and internalizing problem behavior scales and the self-reported SDQ externalizing and internalizing problem behavior scales were used as the primary dependent variables for Aim 3. Each scale had 4-9

items, which were each assessed on a 4-point scale and then summarized in a mean score. Higher scores on the problem behaviors scales indicated problem areas. For each of the four indicators (2 teacher SRS scale scores and 2 child SDQ scale scores), change scores were also calculated by subtracting the third-grade mean score from the fifth-grade mean score.

Academic Indicators

The overall fifth grade math and reading IRT scores were recorded for each child based on how s/he responded to a battery of developmentally appropriate assessments administered by ECLS-K researchers. These scores were also examined as dependent variables. For both of these indicators, change scores were calculated by subtracting the third grade score from the fifth grade score to obtain gains in scores similar to methods used in other ECLS-K research studies (Claessens, Duncan, & Engel, 2009; Georges, Brooks-Gunn, & Malone, 2011).

School absences and number of school days tardy were also examined in fifth grade as continuous data. These data were derived from each child's School Record Abstract Form.

Primary Independent Variable: Aim 3

Aim 3 examined the effects of receipt of school mental health services on students' socio-emotional and academic outcomes and, thus, service receipt was the independent variable in this analysis.

Independent Variables and Covariates for All Aims

Various independent variables and covariates were used in the three aims of the study. The survey administration from which the data came from is indicated for each variable in the following descriptions. First grade variables outlined below were used only in aim 3 of the study, as baseline data to identify the sample of students with mental health need. Third grade variables outlined below were used only in aims 1 and 2 of the study.

Child Measures

Gender: Caregivers reported their children's gender in the overall ECLS-K study (coded as 0=male and 1=female).

Race: An ECLS-K composite variable reported in the overall ECLS-K study included eight categories for race/ethnicity and were combined for this study into the following six categories: 1) White, non-Hispanic; 2) African American, non-Hispanic, Latino (race specified or non-specified); 3) Asian/Pacific Islander; 4) Native American; and 5) Multi-racial, non-Hispanic.

Special education status: Receipt of special education, as reported by teachers in first grade and third grade, was used as a dichotomous (yes/no) variable.

Parent reported child disability: Parent interview respondents reported whether their children had disabilities that were diagnosed by a professional, including vision, hearing, attention, behavior and/or communication in the first and third grades. ECLS-K researchers created a composite variable indicating whether the child had or did not have any of these reported disabilities (yes/no).

Parent reported child emotional concerns: Parent interview respondents were asked in third grade about emotional concerns in the question, *"Do you have any concerns about [child]'s overall emotional behavior, such as anxiety or depression?"* Responses were coded as yes/no.

Residential mobility: Parent interview respondents were asked in first and third grades how many different places their children had lived for four months or more since the last survey administration. This continuous value was categorized into either one location or two or more locations for this study.

School changes: The ECLS-K variable indicating whether a child had changed schools since the previous survey administration was included as a dichotomous (yes/no) variable. In aims 1 and 2, third grade data were used (whether the child had switched schools since first grade) and in aim 3, first grade data were used as pre-treatment characteristics (whether the child had changed schools since kindergarten).

Family Measures

Household socioeconomic status (SES): Socioeconomic status (SES) was computed in first and third grades using data from caregivers who completed the parent interview. This composite

variable reflects the SES of the household at the time of data collection (spring 2000 or spring 2002). The components used to create the SES were as follows: 1) father/male guardian's education; 2) mother/female guardian's education; 3) father/male guardian's occupation; 4) mother/female guardian's occupation; and 5) household income. The SES variable is categorical, with 1 representing the first quintile (lowest) and 5 representing the fifth quintile (highest). Missing data were imputed by ECLS-K researchers for this variable within the ECLS-K dataset.

Parent type: Parent survey respondents were asked to indicate the relationship of each parent in the household to the child in first and third grades. Response choices included: 1=Biological mother and biological father; 2=Biological mother and other father (step, adoptive, foster); 3=Biological father and other mother (step, adoptive, foster); 4=Biological mother only; 5=Biological father only; 6=Two adoptive parents; 7=Single adoptive parent or adoptive parent and stepparent; 8=Related guardian(s); 9=Unrelated guardian(s). These categories were collapsed into four new categories (both biological parents, one biological and one other parent, single biological mother/father, or other caregiver).

Parent education level: The highest education level of the child's parents was reported in nine categories in the first grade ECLS-K parent data. These categories were combined into four new categories: 0=high school graduate or less; 1=some college or vocational/tech program; 2=Bachelor's degree; 3=Graduate or professional degree.

Family structure: The family structure as reported by parent interview respondents in the first grade was categorized into five categories by the ECLS-K: 1=two parents and sibling(s); 2=two parents, no siblings; 3=one parent and sibling(s); 4=one parent, no siblings; 5=other.

Number of siblings: The child's number of siblings, as reported by parent interview respondents in first grade, was categorized from a continuous number to categories of none, one, two, and three or more.

Current marital status: Parents' current marital status in the first grade was collapsed from five options (married, separated, divorced, widowed, never married) into a dichotomous variable: 0=married and 1= separated, divorced, widowed or never married.

Caregiver depressive symptoms: In third grade interviews, caregivers reported depressive symptoms using 12-items that were based on a subset of the Center for Epidemiologic Studies-Depression Scale (Radloff, 1977). Each item was scored from 1 (never) to 4 (most of the time). Higher scores indicated higher levels of symptoms. Respondents' total scores were used as a continuous variable in the analysis for aim 2.

Caregiver involvement at school: Parent interview respondents were asked a series of yes/no questions about activities they participated in at the child's school in first grade, including attending back to school night or open houses, Parent-Teacher Association meetings, parent teacher conferences and school events, such as plays or sports events; participating in school fundraisers; and serving as a school volunteer. A total score was calculated to create a measure of parental involvement at school (total score ranging from 0-6).

Caregiver involvement at home: Parent interview respondents were asked ten questions about how often they participated in activities at home with their child in first grade, such as telling stories, singing songs, helping with arts and crafts, involving their child in household chores, playing games or puzzles, talking about nature or doing science projects, building something or playing with construction toys, playing sports or exercising together, and reading books. A mean score of Likert scale responses (range from 1-not at all to 4-every day) was calculated to create a measure of parental involvement at home.

Caregiver engagement: Parent interview respondents were asked four questions about how often they engaged with their children in first grade, including whether they made time to listen to their child even when really busy and whether they encouraged their child to talk about his/her troubles, to talk about his/her friends, and to express opinions. A mean score of Likert scale

responses (range from 1-never to 4-very often) was calculated to create a measure of caregiver engagement.

School Measures

Several school level variables were used based on school administrator report. The original categorization of these variables from the ECLS-K public dataset was utilized, except where noted:

- Region: ECLS-K categories included south, west, northeast, and Midwest in the first and third grades.
- Urbanicity: ECLS-K categories included rural, urban or suburban in the first and third grades.
- Title 1 status: This binary variable indicated whether the school received funding through the Federal Title 1 grant program designed to give educational assistance to students living in areas of high poverty in the first and third grades.
- School enrollment: Enrollment was categorized by ECLS-K into the following categories: 0-149 students, 150-299, 300-499, 500-749, and 750 and above in the first and third grades.
- Percent minority in the school: This was a composite variable derived by ECLS-K researchers in the first and third grades from principals' responses to the percentage of students enrolled from each racial/ethnic group at their schools. The percent is the total of percentages of non-White students.
- Percent students eligible for free lunch: This was computed by ECLS-K researchers in the third grade by dividing the number of students eligible for the national free lunch program, which is based on family income level, by the total school enrollment.
- Number of full-time equivalent psychological or social work staff ("counseling staff"): Principals' reports in the third grade of numbers of full-time equivalent (FTE) and part-time equivalent staff were combined, after multiplying the reported number of part-time staff by 0.5, to create a new variable that was categorized into none, 0.5 FTE, 1 FTE and >1 FTE.

Classroom measures: Classroom measures were based on teacher report:

- Percent of minority students: This percentage was reported based on classroom enrollment of the proportion of minority students in the classroom of each ECLS-K target child in third grade.
- Teacher's report of classroom behavior: Teachers were asked in the third grade administration to rate their classroom's behavior ranging from "group misbehaves very frequently and is almost always difficult to handle" to "group behaves exceptionally well."
- Ratio of boys to girls: This number was derived by comparing the number of girls to the number of boys in the classroom in third grade and coded as 0=equal ratio; 1=more boys than girls, and 2=more girls than boys.
- Classroom size: This variable was derived from third grade data by categorizing the classroom enrollment into three categories: less than 18 students, 18-22 students, and more than 22 students. Categories were defined based on natural breaks in the data with one-third in each grouping, as well as on national data that there are an average of 20 children in elementary school classrooms (National Center for Education Statistics, 2008) and previous research on classroom size (Biddle & Berliner, 2002; Ready & Lee 2006/7).

Teacher characteristics

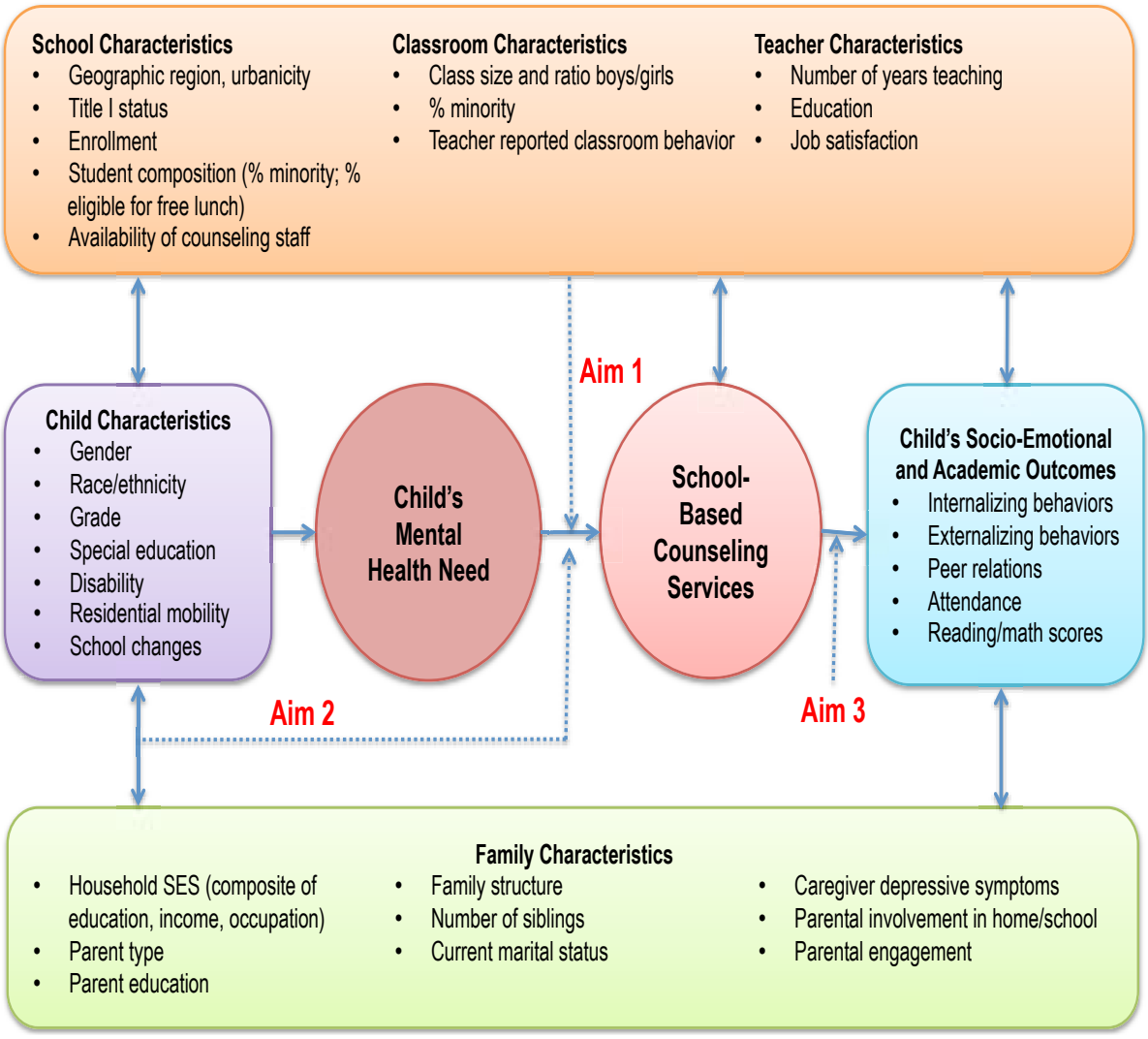
- Number of years teaching: This variable was categorized from the reported number in the third grade ECLS-K data into the following: less than 5 years, 6-10 years, 11-20 years, and over 20 years.
- Highest level of education completed: Teachers reported their highest level of educational attainment in the third grade administration, ranging from high school/associate's/bachelor's degree to doctorate.
- Teacher job satisfaction: This variable was calculated as a mean score based on teachers' responses in the third grade administration to how much they agreed/disagreed with three

statements about their jobs, including whether they enjoyed their present teaching job, whether they felt like they were making a difference in children's lives, and whether they would choose teaching as a profession again.

Analyses

Figure 3-4 provides the analytical framework for this study and describes the relationships between specific indicators of mental health need and service use, contributing factors, and anticipated outcomes that were examined.

Figure 3-4 Analytical Framework to Examine Individual, Family and School Characteristics Associated with SBMH Service Receipt and Subsequent Child Socio-Emotional and Academic Outcomes



For aims 1 and 2, statistical analyses were performed using Stata version 13.0 software (Stata Corporation, 2015). For aim 3, analyses were performed using the R statistical program (R Core Team, 2015) and Stata 13.

Exploratory analysis was conducted with and without weights to examine frequencies (for categorical and dichotomous variables) and means and standard deviations for continuous variables.

Correlations among covariates were examined to avoid multi-collinearity for aims 1 and 2. For aim 2, parent education was highly correlated with SES, thus only SES was used in analyses. The number of individuals in the household and number of siblings were also highly correlated. The number of siblings was used in the analysis, along with the type of parents in the household, which was not correlated with either variable. Collinearity was not a concern for aim 3 in the propensity score models because propensity scores control for multi-collinearity by accounting for all the indicator variables in one score (Stuart, 2010). The pre-treatment covariates were not included in outcome models so collinearity was again not a concern in these aim 3 analyses.

Sample Weighting

For all samples, the appropriate ECLS-K survey weights, with corresponding variables to account for primary sampling units and strata, were applied so that they summed to the original populations. For aims 1 and 2, cross-sectional weights from the third grade administration were used to obtain estimates for the population represented by the third grade cohort in spring 2002. For aim 3, which used data from three survey waves, longitudinal weights were used to weight the sample back to the cohort of kindergartners attending U.S. public schools in 1998/99. While the samples for each of the aims were sub-samples of the original populations, ECLS-K researchers recommended the use of weights with sub-samples as well. However, findings within

each study aim are reflective of the sub-populations that met eligibility criteria for each respective study.

Treatment of Missing Data

Initial exploratory analyses identified missing and invalid data. For aims 1 and 2, multiple imputation was used to estimate missing data on independent variables. Specifically, the multiple imputation (MI) method by chained equations was used in Stata (P. Royston, 2004). Multiple imputation allows for the use of greater available data in analyses compared to complete case analysis, which only uses observations with complete data on all variables of interest. The MI method uses existing data from other related variables to impute variables with missing values in a specified number of new datasets. For this study, ten new datasets were created. Each dataset with imputed values was then analyzed by Stata independently with estimates of parameters of interest averaged across the datasets to yield a single estimate for each missing value. With Stata's MI commands, standard errors were computed to take into account the sampling between and within imputation variability due to the missing data. This approach helped to avoid unbiased estimates and has been used by other researchers who have analyzed ECLS-K data (Morgan, Frisco, Farkas, & Hibel, 2010).

For aims 1 and 2, imputation models included all the variables that were in the analytical models, including the appropriate ECLS-K survey weight and the dependent variable. However, missing data on the dependent variables were not imputed. Each imputation model was checked individually prior to multiple imputation to ensure that it was specified correctly. After imputation, imputed data were examined to determine if they resembled the observed data. For binary and categorical variables, frequency tables were examined and for continuous variables, means and standard deviations were compared. All analytical models were also conducted using complete case analysis and then on the imputed dataset to ensure that the analysis with imputed data produced similar results to the analysis with the original observed data.

For aim 3, missing data were replaced by the mean for each independent variable prior to

conducting the propensity score models to maximize the use of observed data. Missing data were not imputed for the dependent variables.

Aim 1 Analysis

The purpose of aim 1 was to examine the school level factors associated with the receipt of school mental health services among children with mental health needs. Weighting of the sample was conducted in accordance to the ECLS-K protocols. All estimates were adjusted for sample design effects using STATA's survey design estimation commands, which provide corrected standard error estimates. Survey weights accounted for sample stratification, disproportionate sampling, and nonresponse (Tourangeau et al., 2009). The Taylor linearization method was used to obtain unbiased variance estimators and to account for the ECLS-K's complex sampling design. Strata with one sampling unit were centered at the grand mean rather than the stratum mean so they could be retained in the dataset (Stata Corporation).

Descriptive statistics and chi-square tests were performed to compare demographic differences between students identified as having mental health needs and the total ECLS-K third grade sample, as well as those who received SBMH services and those who did not. Weighted bivariate analysis was conducted to assess unadjusted associations between each dependent variable and the outcome of interest (SBMH service receipt). Chi-squared tests of significance were used to analyze differences between children who received services and those who did not on each school level characteristic. T-tests and analysis of variance (ANOVA) were used to analyze differences in continuous variables. Finally, multivariate logistic regression models were conducted in a stepwise fashion to determine the association of the outcome measure with independent variables as follows:

> **Model 1:** Odds ratio (OR) of association of SBMH service receipt with school composition and structural characteristics (i.e., geographic location, urbanicity, enrollment size, Title 1 status, % minority students, % free lunch, counseling staffing level).

$$\text{Log odds } (Y=1) = ß_0 + ß_1X_1 + ß_2X_2 + \ldots . ß_kX_k + e_i$$

where the log odds (Y=1) is defined as the log of odds of receiving mental health services. Each X_1 represents an independent variable associated with outcome Y and each $ß_i$ is the parameter estimate for each X_1.

Model 2: Model 1 + classroom-level school characteristics (i.e., class size; % minority in class; teacher report of classroom behavior; ratio of boys to girls in classroom).

Model 3: Model 2 + teacher characteristics (i.e., number of years teaching, highest level of education completed, teacher job satisfaction).

Differences in odds were considered significant based on a p value of 0.05 or lower.

Aim 2 Analysis

The purpose of Aim 2 was to assess the relationship between children's individual level factors, such as gender, race, type of problem behavior (i.e., internalizing or externalizing behavior), and reporter who identified need (i.e., child and/or teacher) and children's receipt of school mental health services in the third grade. This aim also examined the association of family level factors, such as SES, family structure, and caregiver depressive symptoms, on children's receipt of services. All models were adjusted for significant school level characteristics that were identified to be associated with the receipt of services through the aim 1 analysis, as well as those known to be associated based on prior research.

Analysis was conducted similar to the aim 1 analysis, with the use of survey-based design methods to obtain estimates that were generalizable to the third grade ECLS-K population; descriptive statistics and chi-square tests to compare demographic differences among the ECLS-K cohort and the study sample; weighted bivariate analysis to assess unadjusted associations between each dependent variable and the outcome of interest (SBMH service receipt); and use of Chi-squared tests, t-tests and ANOVA to analyze differences between children who received services and those who did not on each individual and family level characteristic. Multivariate

logistic regression models were analyzed in a stepwise fashion to determine the association of the outcome measure with independent variables as follows:

Model 1: Odds Ratio (OR) for association of receipt of SBMH services with child and family level demographic characteristics (i.e., gender, ethnicity, SES, parent type, number of siblings).

$$\text{Log odds } (Y=1) = ß_0 + ß_1X_1 + ß_2X_2 + \ldots. ß_kX_k + e_i$$

where the log odds (Y=1) is defined as the log of odds of receiving mental health services. Each X_1 represents an independent variable associated with outcome Y and each $ß_i$ is the parameter estimate for each X_1.

Model 2: Model 1 + child level mental health characteristics (i.e., teacher-reported externalizing behavior, teacher-reported internalizing behavior, teacher reported peer relations problems, student-reported externalizing behavior, student-reported internalizing behavior, student-reported peer relations problems, parent-reported emotional concerns)

Model 3 = Model 2 + stressful life events (i.e., number of residential moves, changed schools between 1st and 3rd grade, caregiver depressive symptoms)

Model 4 = Model 3 + child level academic characteristics (i.e., receipt of special education services, math IRT score, reading IRT score)

Differences in odds were considered significant based on a p value of 0.05 or lower. Wald tests were conducted to determine whether the addition of variables in stepwise models improved the model fit.

Aim 3 Analysis

Aim 3 examines whether youth with mental health needs who receive school-based mental health services in third grade have improved socio-emotional and academic outcomes at fifth grade follow-up, compared to their peers with mental health needs who do not receive these services.

Propensity score matching was used to identify children with pre-treatment teacher-reported mental health needs in first grade who received services in third grade and to identify a matched comparison group with similar levels of need who did not receive services. Morgan and colleagues (2010) used similar methods with ECLS-K data to measure the effects of special education services on children's socio-emotional and academic indicators (Morgan et al., 2010).

Propensity score techniques can address potential confounding in observational studies by improving the comparability in treated and control groups (Dugoff, Schuler, & Stuart, 2014). The propensity score method removes bias through the use of observed background characteristics and creating a balancing score that equalizes treatment and comparison groups on these characteristics (Stuart, 2010). Propensity score based full matching was conducted using the MatchIt program in the R statistical package. The full matching approach allows all subjects to be retained in the data analysis sample by grouping individuals into matched sets comprising at least one treated individual and at least one comparison individual with similar propensity scores (Stuart & Green, 2008). Other matching methods, including greedy and optimal matching, were also conducted, however neither performed as well in diagnostic checks of covariate balance. To estimate propensity scores, a multivariable logistic regression model was used with SBMH service receipt as the dependent variable. The propensity score model used covariates based on the significant individual, family and school level factors identified in aims 1 and 2, as well as theory. Next, the performance of the full matching method was assessed through a variety of diagnostic checks, including an examination of each observed covariate's balance before and after matching as determined by visual plots of propensity score distribution, the reduction in standardized mean differences for each variable, and the standardized bias. Standardized biases of less than 0.20 were considered good matches.

After propensity score matching was completed, weighted logistic regressions based on the full matching weights that also incorporated the ECLS-K sample survey design were used to estimate the association of treatment (SBMH service receipt) with fifth grade socio-emotional and

academic outcomes. Weights were obtained my multiplying the appropriate ECLS-K survey weight with the propensity score weight. Regression models would have included matching variables with poor balance (i.e., mean differences of >0.10 in treatment and control balance scores) as controls to further account for remaining confounding in the matched groups. However, all variables were well balanced. Outcome models estimated the effect of SBMH service receipt on the treated (ATT), as well as the sample (SATT) and the population estimates (PATT).

Human Subjects in Research

The Johns Hopkins Bloomberg School of Public Health Institutional Review Board reviewed and determined the study to be exempt research.

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Chapter 4: School Level Characteristics Associated with Children's Receipt of School-Based Mental Health Services

Introduction

Mental, emotional and behavioral disorders affect one out of five young children in the U.S., however only about one-third of youth with mental health problems receive treatment (Farmer et al., 2003; Kataoka et al., 2002; Merikangas et al., 2011). For a large portion of youth who receive mental health services, the public school system is a main provider (Hoagwood & Erwin, 1997; Hoagwood & Johnson, 2003; Merikangas, He, Burstein, et al., 2010). School-based mental health (SBMH) services address many of the traditional barriers children face to receiving mental health care, including limited availability of providers, lack of health insurance and stigma (Heflinger & Hinshaw, 2010; Owens et al., 2002). By providing services in school settings where youth spend the majority of their time, SBMH services may contribute to increased access to care and decreased stigma related to obtaining mental health care (Stephan, Weist, Kataoka, Adelsheim, & Mills, 2007).

According to a national survey conducted by the Center for Mental Health Services and the Substance Abuse and Mental Health Services Administration (SAMHSA), nearly all U.S. schools (97%) reported having at least one staff member whose responsibilities included providing mental health services to students; most commonly school counselors, nurses, school psychologists, and social workers (Teich et al., 2008). According to this survey, the average ratio of mental health staff to students was approximately one staff member per 500 students. However, this varied by urbanicity, with urban schools having a smaller ratio of mental health staff to students (0.8 urban compared to 1.3 rural staff per 500 students). Ratios also varied by region; the highest ratios were found in the Northeast (1.2 per 500 students) and the lowest in the West (0.7 per 500 students).

Several school level factors influence whether students have access to or receive SBMH services. One study found that larger schools, schools located in the Northeast and in suburban and urban settings, and those with greater Medicaid enrollment were more likely to provide

mental health services (Slade, 2003). The number of service providers at the school site also has been associated with increased service receipt, though a recent study did not find an association for the ratio of students to providers (Anglin, Naylor, & Kaplan, 1996; Green et al., 2013; Kaplan, Calonge, Guernsey, & Hanrahan, 1998).

Other school characteristics also may influence students' receipt of services and mental health outcomes and have been less studied. These characteristics have been examined in relation to student behavior and achievement and have been categorized into structural characteristics and student composition (Stone, Brown, & Hinshaw, 2010). Structural characteristics encompass the size and resources of the school and student composition includes the type or composition of students enrolled in the school, such as socioeconomic background. Smaller school and classroom sizes are associated with more positive student outcomes, including fewer student behavioral problems and better attendance (Cotton, 1996; Finn, Pannozzo, & Achilles, 2003). In contrast, larger and less well resourced schools were associated with negative student academic and behavioral outcomes (Han, 2008). Teacher satisfaction and morale can also affect classroom dynamics and how teachers interact with and support their students (Milkie & Warner, 2011). Empirical research on the influences of these characteristics on receipt of SBMH services was not found.

This study examines these school level factors to identify their association with receipt of services in a sample of youth with indications of mental health need given the gap in the literature. The first study hypothesis is that children in schools with higher resources (i.e., more counseling staff, smaller enrollment and class sizes) will be more likely to receive SBMH services than those in schools with fewer such resources. A second hypothesis is that children with mental health needs in schools with a higher proportion of low-income students (based on percentage of those eligible for free lunch and the school having Title 1 status) will be less likely to receive mental health services than those in schools with a lower proportion. Examination of the school level characteristics associated with receipt of services can help to identify disparities,

which, in turn, can help educational agencies make more informed decisions about prioritizing scarce resources to increase students' access to services.

Methods

Study Sample

Data for this study came from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), conducted by Westat and developed under the sponsorship of the U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (Tourangeau et al., 2009). The ECLS-K followed a nationally representative cohort of children from kindergarten into middle school to obtain information on children's cognitive, social, emotional, and physical development, as well as their home, school and classroom environments. Data were obtained from several sources through multiple methods, including self-administered questionnaires from parents, principals and teachers and direct child assessments and questionnaires. This study uses data collected from children, teachers, and school principals in the third grade survey administration conducted in 2002.

The study sample included only children who attended public schools; were identified as having a mental health need in third grade, based on either child self-report or teacher-report (as described below); whose principals reported that there was at least some level of SBMH services offered at their schools; and whose teachers responded to a question about whether the child received SBMH services.[5] Children for whom teachers responded "program not offered" to the SBMH question or whose teacher did not respond were excluded from the sample. Child report of mental health need was based on responses to a survey that assessed how children thought and felt about themselves on three scales: 1) peer relations; 2) internalizing behaviors (e.g., withdrawn in class); and 3) externalizing behaviors (e.g., disruptive behavior). Teacher report of need was also based on three separate scales assessing these same three areas. Exploratory analyses were

[5] A diagram depicting how the final sample was selected is available in the methods section of the authors' full dissertation.

conducted to identify the sample of students with mental health needs. These analyses involved an examination of varying proportions of students with problem scale scores in order to identify a sample that closely resembled epidemiological estimates consistent with the demographic characteristics of children in this age group with mental health needs in other published studies. Based on these exploratory analyses, students who had two or more of their six scores in the top (worst) 15% range of scores were considered to have a potential mental health need. This is consistent with the national estimate that approximately one of out eight children in this age group has an emotional, mental or behavioral disorder (Costello et al., 2003; Merikangas, He, Brody, et al., 2010). Based on the study eligibility criteria, the sample size for the study was 1,608 students who had mental health needs in the third grade.

Measures

Dependent/outcome variable: The outcome variable, SBMH service receipt, was based on teachers' responses to the question, "*Does this child receive instruction and/or related services in any of the following types of programs in your school during the school day?... Individual or group counseling from a trained professional*." Students were categorized into the SBMH group if the teacher responded "yes" and into the non-SBMH group if the teacher responded "no."

Independent variables: School level variables included those related to structural characteristics, including region (South, West, Northeast, Midwest); urbanicity (rural, urban or suburban); Title 1 status (whether the school received funding through the Federal Title 1 grant program designed to give educational assistance to students living in areas of high poverty); school enrollment; and the number of full-time equivalent psychological or social work staff at the school as reported by school principals (hereafter referred to as "counseling staff"). School variables also included those related to school composition, specifically percent minority in the school and percent of students eligible for the national free lunch program, which is based on family income level. The original categorization of these variables from the ECLS-K public dataset was utilized, except for

the counseling staff variable. Principals' reports of full-time equivalent and part-time equivalent staff were combined to create a new variable.

Schools were also categorized based on principals' reports of the ratio of school enrollment category to full-time equivalent (FTE) counseling staff and relative to national data for the average ratio of counseling staff to students (one staff member per 500 students) (Teich et al., 2008). Schools were categorized as either having a favorable ratio (less than 500 students to one FTE or more counseling staff) or an unfavorable ratio (more than 500 students to less than one FTE counseling staff).

Classroom variables included the percent of minority students in the classroom and the teacher's report of classroom behavior; the original ECLS-K coding was maintained for both variables. Ratio of boys to girls in the classroom was obtained by comparing the number of girls to the number of boys in the classroom and coded as equal ratio, more boys than girls, and more girls than boys. Classroom size was derived by categorizing the classroom enrollment into three categories: less than 18 students, 18-22 students, and more than 22 students. Categories were defined based on natural breaks in the data with one-third in each grouping, as well as on national data that there are an average of 20 children in elementary school classrooms (National Center for Education Statistics, 2008) and previous research on classroom size (Biddle & Berliner, 2002; Ready & Lee 2006/7).

Teacher characteristics included number of years teaching, which was categorized from the reported number in the ECLS-K into the following categories: less than 5 years, 6-10 years, 11-20 years, and over 20 years; highest level of education completed, for which ECLS-K categories were maintained; and teacher job satisfaction, which was calculated as a mean score of teachers' responses to three questions about their feelings toward their jobs.

Analyses

Survey-based design methods were used to obtain estimates that were generalizable to the ECLS-K population. Survey weights accounted for sample stratification, disproportionate

sampling, and nonresponse (Tourangeau et al., 2009). The Taylor linearization method was used to obtain unbiased variance estimators and to account for the ECLS-K's complex sampling design. Strata with one sampling unit were centered at the grand mean rather than the stratum mean so they could be retained in the dataset (Stata Corporation).

Descriptive statistics and chi-square tests were performed to compare demographic differences between students identified as having mental health needs and the total ECLS-K third grade sample, as well as those who received SBMH services and those who did not. Weighted bivariate analysis was conducted to assess unadjusted associations between each dependent variable and the outcome of interest (SBMH service receipt). Chi-squared tests of significance were used to analyze differences between children who received services and those who did not on each school level characteristic. T-tests and ANOVA were used to analyze differences in continuous variables. Finally, multivariate logistic regression models were conducted in a stepwise fashion to determine the association of the outcome measure with independent variables as follows:

> **Model 1:** Odds ratio (OR) of association of SBMH service receipt with school composition and structural characteristics (i.e., geographic location, urbanicity, enrollment size, Title 1 status, % minority students, % free lunch, counseling staffing level).
>
> **Model 2:** Model 1 + classroom-level school characteristics (i.e., class size; % minority in class; teacher report of classroom behavior; ratio of boys to girls in classroom).
>
> **Model 3:** Model 2 + teacher characteristics (i.e., number of years teaching, highest level of education completed, teacher job satisfaction).

Models adjusted for children's gender and ethnicity based on prior research suggesting that gender and ethnicity affect mental health service use (Alegria et al., 2012; Chow et al., 2003; Merikangas, He, Brody, et al., 2010; Zahner & Daskalakis, 1997). The number of mental health sub-scale scores a child had in the top (worst) 15 percentile, as well as whether children's

problems were reported by teachers, themselves or both, were highly correlated with the receipt of SBMH services. Thus, models also adjusted for level of mental health need and reporter of mental health need. STATA version 13.0 statistical software package was used to perform all statistical analyses (Stata Corporation, 2015). All estimates were adjusted for sample design effects using STATA's survey design estimation commands, which provide corrected standard error estimates. Multiple imputation by chained equations was used to handle missing data (Patrick Royston & White, 2011). Differences in odds were considered significant based on a p value of 0.05 or lower.

The Johns Hopkins Bloomberg School of Public Health Institutional Review Board determined the study to be exempt research.

Results

Of the eligible study sample, 23% had mental health needs as identified by teachers or children themselves. Of these children, majority had needs identified by both teachers and children (62%), while 28% had needs only identified by teachers and 10% had only self-identified needs.

Compared to the original ECLS-K cohort of third grade students, children with mental health needs were more likely to be male (59% vs. 46%, $p<0.001$) and African American (18% vs. 10%, $p<0.001$) or Latino (20% vs. 17%, $p<0.001$; data not shown). Children with mental health needs were also more likely to attend schools that were in urban areas (35% vs. 31%, $p=0.006$), Title 1 eligible (75% vs. 66%, $p<0.001$), had more than 50% minority students (42% vs. 30%, $p<0.001$) and had 50% or more students in the school lunch program (34% vs. 24%, $p<0.001$) compared to the original ECLS-K third grade cohort. There were no significant differences in geographic region, classroom composition, or school enrollment (data not shown).

Sample Characteristics

Within the sample of children with identified mental health needs, 21% had received SBMH services. Weighted data on characteristics of children with mental health needs who received SBMH services compared to those with mental health needs who did not receive services are also provided in Table 4-1. Significant differences were found in children's race/ethnicity, with the SBMH group comprising a slightly larger percentage of White students and fewer African American and Latino students. Consistent with the definition of mental health need, children in the SBMH group had significantly worse mean scores on internalizing, externalizing and peer relations sub-scales according to teacher report compared to the non-SBMH group. There were no significant differences between SBMH and non-SBMH groups in their schools' urbanicity, enrollment, percent minority children, percent of students eligible for free lunch, or Title 1 status. A larger percentage of students in the SBMH group attended schools with more than one FTE counseling staff compared with those in the non-SBMH group ($p=0.006$). There were also no significant differences in classroom or teacher characteristics of SBMH and non-SBMH children.

Multivariate Regression Results

Structural Characteristics and Receipt of SBMH Services

After adjusting for students' gender, ethnicity, number of mental health sub-scales that were in the top 15%, and the reporter of mental health needs, no significant differences were found in the physical and structural characteristics of schools attended by students who received SBMH and those who did not, including region, urbanicity, enrollment size, percent minority, percent students eligible for free lunch, and Title 1 status (Table 4-2). However, differences were observed in the odds of students with mental health needs receiving SBMH services if they attended a school with more than one FTE counseling staff compared to those in schools with less than a half-time FTE counseling staff (OR: 1.89; $p<0.019$).

Classroom Characteristics and Receipt of SBMH Services

When classroom characteristics were added to the analytical model, class size, classroom composition, and percent minority in the classroom were not associated with children's receipt of SBMH services. The odds of students with mental health need receiving SBMH services were significantly reduced when their teachers reported that their classrooms behaved well or exceptionally well compared to teachers who reported their classrooms misbehaved frequently (Table 4-2).

Teacher Characteristics and Receipt of SBMH Services

Teacher characteristics, including teachers' job satisfaction ratings and educational levels, were not associated with SBMH service receipt. The odds of children with mental health needs receiving SBMH services were higher for children whose teachers had greater years of teaching experience, however this relationship did not reach statistical significance (Table 4-2).

School Characteristics Associated with Counseling Staffing Levels

Given the importance of the ratio of counseling staff to the number of students served, the factors associated with a ratio of one or higher FTE counseling staff were examined. No significant relationships were observed between staff ratios and schools' urbanicity or the percent minority students in the school (Table 3). However, schools in which 50% or more of students were eligible for free lunch were more likely to have a high ratio of staff to students, having significantly reduced odds of an unfavorable ratio of staff to students (>500 students per ≤1 FTE counseling staff) compared to schools in which less than 10% of students were eligible for free lunch (OR: 0.18, $p<0.001$). Significant differences were also found in the odds of having an unfavorable ratio of students to counseling staff based on the school's geographic location, with the Southern (OR: 8.49; $p<0.001$) and Western (OR: 6.11; $p<0.001$) regions having significantly higher odds of having an unfavorable ratio compared to the Northeast (Table 4-3). Dummy variables were used to determine differences for each region compared to all others (data not shown). Schools in the Northeast (OR: 0.328; $p=0.002$) and Midwest (OR: 0.306; $p<0.001$) had

significantly lower odds of having an unfavorable ratio compared to all other regions. Schools in the South had significantly higher odds of having an unfavorable ratio compared to schools in all other regions (OR: 3.96; $p<0.001$). No significant differences were found between schools in the West and schools in all other regions (OR: 2.07; $p<0.071$).

Discussion

In this national sample of third grade children in the ECLS-K study, those with self- and/or teacher-identified mental health needs were more likely than those without such identified needs to attend schools that were located in urban areas, Title 1 eligible, had more than 50% minority students, and had 50% or more students in the free school lunch program. These findings are consistent with a large body of literature documenting that students growing up in disadvantaged environments have significantly poorer indicators of mental health (Brooks-Gunn & Duncan, 1997; Schwartz & Gorman, 2003; Webster-Stratton et al., 2008).

Similar to previous research (Anglin et al., 1996; Kaplan et al., 1998), the school characteristic that was most significantly associated with children receiving SBMH services was the presence of more than one FTE counseling staff at the school. The odds of receiving services nearly doubled for children attending schools with more than one FTE counseling staff compared to those attending schools with only one half-time equivalent. Given the importance of children receiving interventions early on to promote lifelong mental health, increased staffing may be an important strategy for reaching more children with mental health needs. Schools in the southern U.S. had increased odds of having an unfavorable counseling staff to student ratio compared to other regions based on the national average of one FTE to 500 students, which may indicate a need for greater resources focused in this area. Interestingly, schools with a greater proportion of students eligible for free lunch had lower odds of having an unfavorable staff to student ratio. However, given that other economic indicators, such as the school's Title 1 status, were not

significantly associated with differences in odds, this finding indicates an area for further research.

Schools in low resource or high poverty areas are often less likely to have the means to promote healthy child development and may also be located in environments that expose children to additional risk factors, such as violence (Han, 2008; National Research Council and Institute of Medicine, 2009). Thus, it was initially hypothesized that children with mental health needs who attended schools with lower resources or higher needs populations would be less likely to receive SBMH services. However, unlike previous studies (Green et al., 2013; Slade, 2003), these characteristics were not associated with receipt of SBMH services. It is encouraging that these school characteristics do not seem to hinder students' receipt of care, given the importance of ensuring that students in high need areas have access to supports that can help to offset some of the negative influences of their surrounding environments. However, children in these less well resourced schools may also have less access to services outside of school, suggesting that heightened attention may be needed within school to assure appropriate access/receipt of mental health services.

The odds of students receiving SBMH services were significantly reduced when their teachers reported that their classrooms behaved well or exceptionally well compared to teachers who reported their classrooms misbehaved frequently. Previous research has found that effective classroom management can decrease children's behavior problems (Hester et al., 2004; Leflot, van Lier, Onghena, & Colpin, 2010). Thus, this finding may be due to teachers with well-behaved classrooms feeling they are better able to manage or address their students' behavioral problems without the need for external support. It is also possible that when teachers feel they are managing their classrooms well, they are less sensitive to some children's mental health needs. Therefore, this finding warrants further investigation to determine specifically why children in these types of classrooms were less likely to receive SBMH services.

There are several limitations to this study. First, reporter bias is a concern when defining the sample of children with mental health needs given that not all teachers are trained to identify children with mental health needs and not all children are comfortable sharing or able to recognize their own needs. There also may have been variation between reporters on how they assessed problem behaviors, i.e., some teachers may have rated children more or less severely on problem behaviors than others. These biases may have led to some children being excluded from the sample of youth with mental health needs, or others being included who did not have mental health needs.

This study is also limited to those students whose teachers indicated that they are receiving mental health services during the school day. This is problematic since teachers may not be aware if children are receiving these services at school. However, given the age group (third graders), teachers are more likely to know this information about their students since they tend to spend the whole school day with the same students in their classrooms (Reback, 2010). Moreover, the study was limited to principals who reported that there was at least a half-time FTE counseling staff at their school. Over 200 students were excluded from this study because of missing data on this variable. Furthermore, due to the survey design and how questions were posed to parents about children's receipt of services, it was not possible to determine if children received mental health services outside of the school setting.

Despite these limitations, the study findings provide a foundation for understanding how select school characteristics, including student composition and structural characteristics, as well as classroom and teacher characteristics, affect students' receipt of SBMH services. The most significant finding from this study was that greater availability of counseling staff is associated with greater service receipt. The American Counseling Association recommends a school-counselor-to-student ratio of 1:250 and the National Association of School Psychologists recommends a ratio of 1:500-700, when school psychologists are providing comprehensive and preventive services (i.e., evaluations, individual/group counseling, crisis response, etc.)

(American School Counselor Association; McGraw & Koonce, 2011). Very few schools in this study met these criteria. In recent years, there has been a national call to increase mental health services in schools (President's New Freedom Commission on Mental Health, 2003; U.S. Government). This study supports this call with evidence that increased services could help to reach more students with mental health needs. This study also found a geographic disparity in the distribution of service receipt, with schools in the South being significantly more likely than other regions to have an unfavorable ratio of counseling staff to students compared to the national average. Given that there are more children living in poverty in the southern United States, a factor linked to poorer educational and health outcomes (Coley & Baker, 2013), an investment of resources to expand SBMH services may be warranted, as would additional research to identify which specific geographic locations have higher needs and could benefit from more resources. Further studies should also examine the specific types and organization of SBMH services that reach the students most in need. Understanding what drives students' access to and use of SBMH services is key to ensuring that scarce resources are distributed to reach youth who would benefit most from these supports.

Table 4-1 Weighted Sample Characteristics

	Received SBMH (n=110,651)	Did not receive SBMH (n=354,728)	P value
INDIVIDUAL CHARACTERISTICS			
Gender			0.012
Male	67% (74,372)	59% (210,212)	
Female	33% (36,279)	41% (144,516)	
Ethnicity			0.012
White	60% (66,742)	50% (175,377)	
African American	19% (21,541)	22% (76,264)	
Latino	13% (14,841)	22% (78,210)	
Asian	1% (1,293)	3% (11,216)	
Other	6% (6,234)	4% (13, 149)	
Score (# sub-scales in top 15%)*			<0.001
2	40% (44,529)	58% (205,598)	
3	31% (34,278)	27% (95,223)	
4	21% (23,030)	12% (41,066)	
5	6% (6,546)	3% (10,581)	
6	2% (2,269)	1% (2,260)	
Reporter			0.001
Teacher only reported scores in top 15% in ≥2 sub-scales	28% (31,107)	23% (81,128)	
Child only reported scores in top 15% in ≥2 sub-scales	10% (11,075)	22% (78,994)	
Teacher and child reported scores in top 15% in ≥2 sub-scales	62% (68,469)	55% (194,606)	
Teacher reported problem scales (mean score; range 1-4)			
Internalizing behaviors	2.24 (SE: 0.046)	1.95 (SE: 0.022)	<0.001
Externalizing behaviors	2.56 (SE: 0.047)	2.25 (SE: 0.025)	<0.001
Peer relations (reversed score, lower is worse)	2.36 (SE: 0.034)	2.58 (SE: 0.020)	<0.001
Child reported problem scales (mean score; range 1-4)			
Internalizing behaviors	2.61 (SE: 0.054)	2.71 (SE: 0.030)	0.108
Externalizing behaviors	2.60 (SE: 0.047)	2.57 (SE 0.282)	0.483
Peer relations (reversed score, lower is worse)	2.81 (SE: 0.056)	2.76 (SE: 0.022)	0.273
SCHOOL STRUCTURAL CHARACTERISTICS			
Region			0.415
Northeast	19% (20,637)	16% (55,381)	
Midwest	28% (31,178)	25% (87,166)	
South	30% (33,681)	38% (133,440)	
West	23% (25,154)	22% (78,742)	
Urbanicity			0.981
Urban	34% (36,831)	33% (113,924)	
Suburb and large town	42% (45,496)	42% (142,343)	
Small town and rural	24% (26,604)	25% (86,446)	
Title 1 eligible			0.857
Title 1	75% (70,575)	76% (231,090)	
Non-title 1	25% (23,817)	24% (74,584)	
Counseling staff full-time equivalent			0.006
0.5 FTE	40% (35,620)	46% (129,990)	
1 FTE	33% (30,262)	38% (107,916)	
>1 FTE	28% (25,503)	16% (45,873)	
School enrollment			0.171
<150	3% (3,203)	2% (7,896)	
150-299	14% (14,928)	11% (39,289)	
300-499	41% (45,071)	36% (125,644)	
500-749	31% (34,700)	31% (110,691)	
750 and above	11% (12,293)	19% (68,008)	
SCHOOL COMPOSITION			
Percent minority in school			0.235
<10%	27% (28,970)	23% (80,507)	
10% to <25%	23% (24,929)	19% (65,255)	
25% to <50%	16% (17,267)	16% (56,099)	
50% to <75%	13% (13,577)	15% (50,807)	
75% or more	21% (22,350)	28% (98,023)	
Percent free lunch eligible in school			0.291
<10%	18% (19,599)	13% (45,841)	
10% to <25%	19% (20,924)	24% (83,345)	
25% to <50%	31% (33,951)	30% (104,347)	
50% or more	31% (33,927)	33% (116,676)	

	Received SBMH (n=110,651)	Did not receive SBMH (n=354,728)	P value
CLASSROOM CHARACTERISTICS			
Class size			0.326
< 18 students	34% (35,717)	37% (126,899)	
18-22 students	38% (39,722)	32% (109,856)	
>22 students	28% (29,600)	32% (108,945)	
Percent minority in classroom			0.058
<10%	31% (30,152)	22% (74,978)	
10% to <25%	20% (19,497)	17% (57,629)	
25% to <50%	19% (18,307)	17% (57,652)	
50% to <75%	9% (8,597)	14% (45,277)	
75% or more	22% (21,697)	29% (97,930)	
Classroom composition			0.825
Equal number boys and girls	14% (14,321)	12% (14,321)	
More boys	49% (51,106)	50% (171,217)	
More girls	38% (39,614)	38% (129,949)	
Perception of classroom behavior			0.083
Group misbehaves very frequently	5% (5,598)	2% (5,830)	
Group misbehaves frequently	16% (16,516)	15% (50,595)	
Group misbehaves occasionally	46% (49,1010)	43% (147,444)	
Group behaves well	27% (28,004)	32% (111,272)	
Group behaves exceptionally well	6% (5,889)	8% (28,030)	
TEACHER CHARACTERISTICS			
Job satisfaction (mean score; range 1-5)	4.17 (SE: 0.042)	4.17 (SE: 0.030)	0.979
Years teaching			0.511
<5 years	24% (25,027)	29% (101,507)	
6-10 years	20% (20,691)	19% (64,503)	
11-20 years	28% (29,035)	25% (84,941)	
>20 years	29% (30,992)	27% (94,059)	
Highest education level			0.908
High school diploma/GED/associate's degree	27% (28,796)	29% (99,810)	
Bachelor's degree/ at least 1 year coursework post Bachelor's	30% (31,889)	30% (103,213)	
Master's degree	37% (38,672)	35% (119,907)	
Coursework post-master's degree/doctorate	5% (5,718)	6% (21,907)	

SE=standard error
* Children with only one sub-scale score in the top 15% were not eligible for this study.

Table 4-2 Multivariate Associations Between School Characteristics and Children's Receipt of SBMH Services [AOR: Adjusted Odds Ratio (CI: 95% Confidence Interval)]

	Model 1			Model 2			Model 3		
	AOR	CI	P value	AOR	CI	P value	AOR	CI	P value
SCHOOL STRUCTURAL CHARACTERISTICS									
Region (ref=Northeast)									
Midwest	0.81	0.46-1.44	0.474	0.87	0.49-1.55	0.638	0.91	0.50-1.64	0.748
South	0.79	0.42-1.46	0.444	0.81	0.45-1.49	0.501	0.84	0.46-1.55	0.582
West	1.21	0.61-2.40	0.583	1.26	0.64-2.47	0.509	1.25	0.64-2.47	0.514
Urbanicity (ref=urban)									
Suburb and large town	0.81	0.53-1.24	0.332	0.72	0.47-1.11	0.137	0.72	0.47-1.09	0.116
Small town and rural	0.72	0.39-1.32	0.291	0.61	0.34-1.09	0.092	0.59	0.33-1.06	0.076
Title 1 eligible	1.00	0.56-1.80	0.997	0.98	0.55-1.81	0.993	0.97	0.53-1.77	0.926
Counseling staff full-time equivalent (ref=0.5 FTE)									
1 FTE	0.98	0.67-1.44	0.930	1.00	0.68-1.47	0.983	1.01	0.68-1.50	0.964
>1 FTE	1.89	1.11-3.22	0.019	1.80	1.07-3.01	0.026	1.80	1.08-3.02	0.025
School enrollment (ref =<150)									
150-299	0.12	0.31-4.06	0.864	1.24	0.34-4.47	0.746	1.33	0.37-4.77	0.661
300-499	1.22	0.39-3.79	0.736	1.50	0.49-4.67	0.478	1.60	0.51-4.98	0.417
500-749	1.09	0.34-3.45	0.887	1.30	0.41-4.06	0.655	1.40	0.44-4.46	0.565
750 and above	0.66	0.19-2.35	0.520	0.82	0.23-2.91	0.759	0.91	0.25-3.26	0.881
SCHOOL COMPOSITION									
Percent minority in school (ref=<10%)									
10% to <25%	0.96	0.53-1.74	0.900	1.20	0.61-2.36	0.587	1.18	0.62-2.27	0.614
25% to <50%	0.97	0.56-1.68	0.923	1.46	0.63-3.42	0.377	1.42	0.61-3.32	0.414
50% to <75%	0.65	0.33-1.26	0.200	1.28	0.42-3.91	0.662	1.27	0.41-3.95	0.674
75% or more	0.65	0.31-1.38	0.265	1.26	0.37-4.32	0.710	1.22	0.35-4.26	0.753
Percent free lunch eligible in school (ref=<10%)									
10% to <25%	0.64	0.34-1.19	0.155	0.60	0.32-1.11	0.103	0.58	0.31-1.07	0.083
25% to <50%	0.99	0.50-1.99	0.993	0.88	0.44-1.74	0.707	0.87	0.44-1.73	0.690
50% or more	1.18	0.54-2.61	0.677	1.05	0.49-2.27	0.900	1.05	0.48-2.30	0.893
CLASSROOM CHARACTERISTICS									
Class size (ref=18-22 students)	-	-	-						
< 18 students				1.30	0.86-1.95	0.207	1.33	0.88-2.03	0.174
>22 students				1.08	0.72-1.61	0.708	1.05	0.71-1.55	0.794
Percent minority in classroom (ref=<10%)	-	-	-						
10% to <25%				0.60	0.30-1.23	0.163	0.61	0.30-1.24	0.170
25% to <50%				0.62	0.27-1.41	0.253	0.64	0.28-1.47	0.293
50% to <75%				0.36	0.11-1.15	0.083	0.36	0.11-1.18	0.092
75% or more				0.39	0.12-1.29	0.121	0.40	0.17-1.36	0.141
Classroom composition (ref=equal boys/girls)	-	-	-						
More boys				0.74	0.43-1.30	0.299	0.73	0.41-1.27	0.262
More girls				0.79	0.45-1.39	0.408	0.78	0.47-1.37	0.384
Teacher's perception of classroom behavior (ref=group misbehaves very frequently)	-	-	-						
Group misbehaves frequently				0.35	0.10-1.28	0.113	0.35	0.10-1.18	0.089
Group misbehaves occasionally				0.36	0.11-1.13	0.079	0.34	0.11-1.04	0.059
Group behaves well				0.28	0.08-0.94	0.039	0.25	0.08-0.82	0.023
Group behaves exceptionally well				0.26	0.06-1.04	0.057	0.22	0.06-0.86	0.030
TEACHER CHARACTERISTICS									
Job satisfaction (mean score)	-	-	-	-	-	-	1.11	0.87-1.43	0.395
Years teaching (ref=<5 years)	-	-	-	-	-	-			
6-10 years							1.43	0.87-2.36	0.156
11-20 years							1.49	0.88-2.51	0.134
>20 years							1.48	0.91-2.40	0.113
Highest education level (ref=HS diploma/GED/Associate)	-	-	-	-	-	-			
Bachelor/ ≥1 year coursework							1.05	0.68-1.63	0.819
Master's degree							1.01	0.64-1.59	0.966
Post-master/doctorate							0.81	0.35-1.84	0.608

Ref=reference group; All models adjusted for student gender, ethnicity, number of mental health problems and reporter of need.

Table 4-3 School Characteristics Associated with Unfavorable Ratio of 1 Counseling Staff Full-Time Equivalent to >500 Students [AOR: Adjusted Odds Ratio (CI: 95% Confidence Interval)]

	AOR	CI	P value
SCHOOL STRUCTURAL CHARACTERISTICS			
Region (reference=Northeast)			
Midwest	1.16	0.61-2.22	0.643
South	8.49	3.52-20.47	<0.0001
West	6.11	2.29-16.28	<0.0001
Urbanicity (reference=urban)			
Suburb and large town	1.37	0.63-2.99	0.424
Small town and rural	0.51	0.20-1.28	0.150
Title 1 eligible	1.24	0.71-2.17	0.439
SCHOOL COMPOSITION			
Percent minority in school (reference=<10%)			
10% to <25%	0.67	0.32-1.39	0.281
25% to <50%	0.73	0.27-1.98	0.538
50% to <75%	1.03	0.38-2.81	0.956
75% or more	2.47	0.81-7.55	0.114
Percent free lunch eligible in school (reference=<10%)			
10% to <25%	0.88	0.44-1.73	0.700
25% to <50%	0.72	0.33-1.55	0.399
50% or more	0.18	0.07-0.49	0.001

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Chapter 5: Child and Family Level Characteristics Associated with School-Based Mental Health Services Receipt

Introduction

In the United States, it is estimated that nearly one in eight children ages eight to eleven years suffers from a mental, emotional, or behavioral disorder (Merikangas, He, Brody, et al., 2010). Furthermore, an estimated one in ten youth has serious emotional disturbances that impairs functioning at home, in school or with peers (Merikangas, He, Burstein, et al., 2010). Yet, only about one-third of youth with mental health problems receive treatment to address these needs (Farmer et al., 2003; Kataoka et al., 2002; Merikangas et al., 2011), which often persist into adolescence and adulthood with significant costs to both the individual and society.

A variety of individual child and family level factors contribute to the development of children's mental health problems. At the individual level, children's gender affects their risk, with boys at increased risk for externalizing problems (e.g., acting out) and girls at increased risk for internalizing behaviors (e.g., anxiety, being withdrawn) (Merikangas & Nakamura, 2011). Previous research has shown variations in risk by race/ethnicity, however national community surveys have revealed only minor differences in the need for mental health services by children's racial/ethnic background after adjusting for socio-economic status (Merikangas, He, Burstein, et al., 2010). Cognitive and psychosocial functioning and exposure to stressful life events, such as violence, abuse, or frequent moves, also may increase children's risk for mental health problems (Merikangas & Nakamura, 2011; National Research Council and Institute of Medicine, 2009).

Family and parent characteristics that affect children's risk include parental socioeconomic status (SES) and employment. Children from lower SES or less stably employed families, likely with less access to health insurance, experience higher risk for mental health problems, though findings are not consistent and many of these children avoid mental health problems (Merikangas & Nakamura, 2011). Problem behaviors also are more frequent among children from unmarried families than from married families, as well as those from single parent homes compared to two parent homes (Ackerman et al., 2001; Merikangas & Nakamura, 2011).

Moreover, maternal depression can lead to negative mental health outcomes in offspring during childhood. In middle childhood, children of depressed mothers have significantly higher rates of mood disorders, internalizing behaviors, externalizing behaviors, and other difficulties in emotional development compared to children of non-depressed mothers (Goodman et al., 2011). These stressful life circumstances, which are associated with the development of emotional and behavioral problems, are especially challenging for families with limited resources. Coping with their own distress, as well as the challenges of poverty and supporting their families, can also adversely affect parents' ability to recognize their children's mental health needs or navigate systems to help them obtain mental health care.

The influence of these factors on receipt of mental health services also has been the subject of many studies. Child and family level factors associated with mental health service use include age, gender, ethnicity, socioeconomic status (SES), parental education, and marital status (Merikangas, He, Burstein, et al., 2010; Zahner & Daskalakis, 1997). Minority youth have been found to receive care at significantly lower rates than their peers (Alegria et al., 2012; Chow et al., 2003), while there are mixed findings on the relationship between family SES and service receipt (Merikangas, He, Brody, et al., 2010). In terms of mental health risks, children with externalizing or disruptive behaviors, such as delinquency or aggression, typically receive treatment more often than those with emotional concerns, such as anxiety (Merikangas, He, Burstein, et al., 2010; Zahner & Daskalakis, 1997).

There are many components of the mental health care system that lead to barriers, such as limited providers, high out of pocket costs, inaccessible locations, lack of transportation, and inconvenient hours (Owens et al., 2002; Samargia et al., 2006). These issues disproportionately affect racial minority youth who are more likely to live in low-income, under-resourced areas with limited or lower quality service availability and who may not have available transportation (Chow et al., 2003). School-based mental health (SBMH) services overcome many of these barriers by bringing services to youth in a familiar setting regardless of their ability to pay

(Bringewatt & Gershoff, 2010). For many youth who receive mental health services, the public school system is a primary source of care (Hoagwood & Erwin, 1997; Hoagwood & Johnson, 2003; Merikangas et al., 2011).

While there is a considerable body of literature examining the individual child and family level characteristics associated with receipt of mental health care in general, there is less known about the characteristics associated with receipt of SBMH services. One study based on a nationally representative school-based sample of adolescents reported no racial/ethnic differences in SBMH service use compared to significant racial/ethnic differences in clinic-based service use for youth with high mental health needs (Cummings & Druss, 2011). Studies have also found mixed effects of family income or socioeconomic status on SBMH service receipt. Two previous studies noted that these characteristics are associated with either no significant differences in SBMH service use or higher use among those who lived in poverty (Farmer, Stangl, Burns, Costello, & Angold, 1999; Glied, Hoven, Garrett, & Moore, 1997). In contrast, a more recent study found that children whose parents had higher incomes were more likely to receive SBMH services (Langer et al., 2015). One study of elementary school children also found that receipt of special education services was associated with SBMH service receipt (Reback, 2010).

This study examines several individual child and family level factors to identify their association with receipt of SBMH services in a sample of youth with indications of mental health need. The first study hypothesis is that there will be demographic differences between children who receive SBMH services and those who do not, similar to the differences observed in general mental health service receipt (i.e., gender, socioeconomic status, family type). In particular, it is hypothesized based on the literature that males, children from single parent families and those with lower SES will have greater odds of receiving SBMH services. A second study hypothesis is that there will be differences in receipt of SBMH services based on children's indications of mental health need (i.e., problem behavior type, level of need, or reporter type). Specifically, it is hypothesized based on the literature that those with externalizing behaviors and those with higher

indications of need will have greater odds of receiving SBMH services. Examination of the individual and family characteristics associated with receipt of SBMH services may contribute to the limited literature on which characteristics are associated with receipt of care in the school setting among youth with mental health needs. Findings also may help identify which students in need are not receiving care, and therefore where additional resources could be focused.

Conceptual Model

Figure 5-1 provides a conceptually based analytical framework that depicts factors that influence children's development of mental health need, receipt of SBMH services, and subsequent outcomes (the latter of which is not a focus of this paper). This framework is broadly based on Andersen's Behavioral Model of Health Services Use (Aday & Andersen, 1974). This model, in its early stages, distinguished three types of individual and contextual determinants of health services use broadly characterized as "population characteristics", which can also be applied to mental health service use: 1) predisposing factors, 2) enabling factors; and 3) service need factors (R. M. Andersen, 1995; R.M. Andersen, 2008). Individual predisposing factors include those characteristics that exist prior to the experience of a health services need, including demographic characteristics, family social status, and health beliefs. Enabling factors include those conditions that allow an individual to access services, such as availability of services and resources in the school. Need factors can include the individual's perceived need for services, as well as the evaluated need based on a professional's assessment. In the case of SBMH services, this evaluation would be based on teachers' evaluation of children's mental health problems. This conceptual framework guides the examination of factors related to children's receipt of SBMH services, with a focus on individual and family predisposing and need characteristics. The factors in italics are identified in the literature as other contributing factors to mental health need and service receipt but are not explored in this study due to limited availability of data. The dashed lines indicate the outcomes that are not described in this study.

Methods

Study Sample

Data for this study came from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K). The ECLS-K is a longitudinal study conducted by Westat and developed under the sponsorship of the U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (Tourangeau et al., 2009), that followed a nationally representative cohort of children from kindergarten into middle school. The survey obtained information on children's cognitive, social, emotional, and physical development, as well as their home, school and classroom environments. Data were obtained through self-administered questionnaires from parents/caregivers, principals and teachers, as well as direct child assessments and questionnaires. This study uses data collected from children, teachers, and school principals in the third grade survey administration conducted in 2002.

The initial study sample included only children who attended public schools; were identified as having a mental health need in third grade, based on either child self-report or teacher-report (as described below); whose caregivers responded to the parent questionnaire; and whose teachers responded to a question about whether the child received SBMH services.[6] Children for whom teachers responded "program not offered" to the SBMH question or whose teacher did not respond were excluded from the sample. Child report of mental health need was based on responses to survey questions that assessed how children thought and felt about themselves socially on three scales: 1) internalizing behaviors (e.g., withdrawn in class); 2) externalizing behaviors (e.g., disruptive behavior); and 3) peer relations. ECLS-K researchers adapted the items on the peer scale with permission from the Self-Description Questionnaire I (Marsh, 1992). The items in the two problem behavior scales were developed specifically for the ECLS-K. The scale reliabilities (alpha coefficients) were: peer scale – 0.79; externalizing

[6] A diagram depicting how the final sample was selected is available in the methods section of the authors' full dissertation.

problems – 0.77; and internalizing problems – 0.81 (Tourangeau et al., 2009). Teacher report of need was based on three separate scales assessing these same three areas. Teacher-reported measures were adapted from the Social Skills Rating Scale (SRS): Elementary Scale A instrument (Gresham & Elliott, 1990). The split-half reliability for the Teacher SRS scores were: externalizing problem behaviors – 0.89; internalizing problem behaviors – 0.76; and peer relations – 0.92 (Tourangeau et al., 2009). Exploratory analysis was conducted to identify the sample of students with mental health needs. This analysis involved an examination of the proportions of students with the highest problem scale scores to identify a sample that closely resembled epidemiological estimates and demographic and mental health characteristics of children in this age group with mental health needs in other published studies. Exploratory analysis with various cutoffs, for example, those with one mental health problem behavior in the top 15% or those with two or more problem behaviors in the top 5%, led to biased estimates of children with mental health need. The former identified over 50% of the sample as having mental health need, and the latter less than 5%. Based on this exploratory analysis, students who were in the top (worst) 15% of scores on any two or more of these six sub-scales were considered to have a potential mental health need. This was consistent with the national estimate that approximately one of out eight children in this age group have emotional, mental or behavioral disorders (Costello et al., 2003; Merikangas, He, Brody, et al., 2010). Based on these criteria, the sample size for the study was 1,529 students who had mental health needs in the third grade, which was 11% of the initial study sample of third grade students in the ECLS-K study.

Measures

Dependent/outcome variable: The outcome variable, SBMH service receipt, was based on teachers' responses to the question, "*Does this child receive instruction and/or related services in any of the following types of programs in your school during the school day?... Individual or group counseling from a trained professional*." Students were categorized into the SBMH group if the teacher responded "yes" and into the non-SBMH group if the teacher responded "no."

Independent variables:

Demographic Characteristics: Children's gender, ethnicity, SES and parent type were included as predictors based on prior research suggesting that these factors affect mental health service use (Alegria et al., 2012; Chow et al., 2003; Merikangas, He, Brody, et al., 2010; Zahner & Daskalakis, 1997). An ECLS-K composite variable included the following categories for race/ethnicity: White, African American, Latino, Asian/Pacific Islander, Native American and multi-racial. SES was categorized within quintiles, based on the original ECLS-K coding. This composite variable reflects the SES of the household at the time of data collection (spring 2002). The components used by ECLS-K researchers to create the SES variable included father/male and mother/female guardians' education, father/male and mother/female guardians' occupations, and household income. Parent type was categorized within four categories (biological parents, one biological and one other parent, single biological mother/father, other caregiver), which were derived from ECLS-K's larger categories of parents living with the child. The child's number of siblings was categorized from a continuous number to none, one, two or three or more. Parent interview respondents also reported whether their children had disabilities that were diagnosed by a professional, including vision, hearing, attention, behavior and/or communication. ECLS-K researchers created a composite variable indicating whether the child had or did not have any of these reported disabilities (yes/no).

Mental health characteristics: As described previously, teacher and child reported scores on externalizing, internalizing, and peer relations problem behaviors were used as reported. These scores were also combined to create two new variables: 1) a total number of sub-scale scores in the top 15%, ranging from two to six scores; and 2) a variable categorizing the reporter of problem behaviors (teacher, child or both). Parent interview respondents also were asked about emotional concerns in the question, *"Do you have any concerns about [child]'s overall emotional behavior, such as anxiety or depression?"* Responses were coded as yes/no.

Stressful life experiences: Parent interview respondents were asked how many different places their children had lived for four months or more since the last survey administration. This value was categorized into either one location or two or more locations. The ECLS-K variable indicating whether a child had changed schools since the previous survey administration was included as a dichotomous (yes/no) variable. Parent interview respondent depressive symptoms were assessed using 12-items that were based on a subset of the Center for Epidemiologic Studies-Depression Scale (Radloff, 1977). Each item was scored from 1 (never) to 4 (most of the time). Higher scores indicated higher levels of symptoms. Respondents' total scores were used as a continuous variable in the analysis. These items were included based on previous literature documenting a link between the development of mental health problems and stressful life experiences, including frequent moves and maternal depression (Goodman et al., 2011; National Research Council and Institute of Medicine, 2009).

Academic characteristics: Children's overall third grade math and reading Item Response Theory (IRT) scores, which can be used to identify cross-sectional differences among subgroups in overall achievement (Tourangeau et al., 2009), were recorded for each child based on how they responded to a battery of developmentally-appropriate assessments administered by ECLS-K researchers. Assessment items were developed by education and child development experts and reviewed by elementary school curriculum specialists for appropriateness of content and difficulty. Receipt of special education, as reported by teachers, was also included as a dichotomous (yes/no) variable.

Covariates: The parent interview respondent's relationship to the child, which included mother, father, and other caregivers, was included as a covariate. School level variables included in the analyses included region (South, West, Northeast, Midwest); urbanicity (rural, urban or suburban); Title 1 status (whether the school received funding through the Federal Title 1 grant program designed to give educational assistance to students living in areas of high poverty); school enrollment; and the number of full-time equivalent psychological or social work staff at

the school as reported by school principals. The original categorization of these variables from the ECLS-K public dataset was utilized, except for the psychological and social work staff effort variable. Principals' reports of numbers of full-time equivalent (FTE) and part-time equivalent staff were combined, after multiplying the reported number of part-time staff by 0.5, to create a new variable that was categorized into 0.5 FTE, 1 FTE and >1 FTE.

Analyses

Survey-based design methods were used to obtain estimates that were generalizable to the third grade ECLS-K population. Survey weights accounted for sample stratification, disproportionate sampling, and nonresponse (Tourangeau et al., 2009). The Taylor linearization method was used to obtain unbiased variance estimators and to account for the ECLS-K's complex sampling design. Strata with one sampling unit were centered at the grand mean rather than the stratum mean so they could be retained in the dataset (Stata Corporation, 2015).

Descriptive statistics and chi-square tests were used to compare demographic differences between students identified as having mental health needs and the total ECLS-K third grade sample, as well as those who received SBMH services and those who did not. Weighted bivariate analysis was conducted to assess unadjusted associations between each dependent variable and the outcome of interest (SBMH service receipt). Chi-squared tests of significance were used to analyze differences between children who received services and those who did not on each school level characteristic. T-tests and ANOVA were used to analyze differences in continuous variables. Finally, multivariate logistic regression models were analyzed in a stepwise fashion to determine the association of the outcome measure with independent variables as follows:

Model 1: Odds Ratio (OR) for association of receipt of SBMH services with child and family level demographic characteristics (i.e., gender, ethnicity, SES, parent type, number of siblings).

Model 2: Model 1 + child level mental health characteristics (i.e., teacher-reported externalizing behavior, teacher-reported internalizing behavior, teacher reported peer

relations problems, student-reported externalizing behavior, student-reported internalizing behavior, student-reported peer relations problems, parent-reported emotional concerns)

Model 3 = Model 2 + stressful life events (i.e., number of residential moves, changed schools between 1st and 3rd grade, caregiver depressive symptoms)

Model 4 = Model 3 + child level academic characteristics (i.e., receipt of special education services, math IRT score, reading IRT score)

Analyses of models 2-4 used the six mental health problem scales. Analyses were repeated twice more, using composites of the six scales. Two composites were created, one replaced children's six sub-scale scores with a new variable that summarized children's level of mental health need based on the number of scores they had in the top 15% (range 2-6 scores). The second categorized children based on whether they were in the top 15th percentile based on reports by their teacher, the child or both. As these two composite variables were derived from the same original data, only one was included in the logistic regression analyses at a time. Models 2-4 were analyzed again using first one composite variable and then the other.

All models were adjusted for the relationship of the parent interview respondent to the child (mother, father, or other caregiver), as well as school level characteristics, including geographical region, urbanicity, Title 1 status, school enrollment, and the number of full-time equivalent psychological or social work staff at the school as reported by school principals.

STATA version 13.0 statistical software package was used to perform statistical analyses (Stata Corporation, 2015). STATA's survey design estimation commands were used to adjust estimates for sample design effects and obtain corrected standard error estimates. Multiple imputation by chained equations was used to handle missing data (Patrick Royston & White, 2011). Differences in odds were considered significant based on a p value of 0.05 or lower. Wald tests were conducted to determine whether the addition of variables in stepwise models improved the model fit. The Johns Hopkins Bloomberg School of Public Health Institutional Review Board reviewed and determined the study to be exempt research.

Results

Sample Characteristics

Of the original ECLS-K third grade cohort, 23% had mental health needs as identified by teachers or children themselves. Of these children, almost two-thirds were identified by both teachers and children themselves (62%); 28% had needs only identified by teachers and 11% had only self-identified needs.

Compared to the original cohort of ECLS-K third grade students, children with mental health needs were more likely to be male (60% vs. 46%, $p<0.001$), African American (19% vs. 10%, $p<0.001$) or Latino (20% vs. 16%, $p<0.001$; data not shown). They were less likely to be White (51% vs. 62%, $p<0.001$). Children with mental health needs were also more likely to have a disability according to parent report (36% vs. 25%, $p<0.0001$), receive special education (13% vs. 6%, $p<0.001$), have parents with SES in the lower two quintiles (47% vs. 32%, $p<0.001$), and to not live with both biological parents (47% vs. 29%, $p<0.001$) compared to the original ECLS-K cohort of third graders (data not shown).

Within the sample of children with identified mental health needs, 25% had received SBMH services. As shown in Table 5-1, among children who received SBMH services, the majority were males (70%) and White (59%). Additionally, 50% of children who received SBMH services were reported to have a disability by their caregivers. Most had lived in one place (84%) and had not changed schools (64%) since the first grade. One-fifth (19%) received special education.

Weighted data on characteristics of children with mental health needs who received SBMH services compared to those with mental health needs who did not receive services are provided in Table 5-1. Among children with mental health needs, receipt of mental health care was significantly associated with children's gender, with the SBMH group comprising more males (70% SBMH vs. 61% non-SBMH, $p=0.007$), as well as race/ethnicity, with the SBMH

group comprising a larger percentage of White students (59% vs. 44%) and fewer African American (19% vs. 24%) and Latino (15% vs. 24%) students (p=0.004). Children in the SBMH group were more likely to live with one biological parent and one non-biological parent (28% vs. 15%) or with other caregivers (10% vs. 6%) rather than both parents (p<0.001). There were fewer children whose caregivers reported they had disabilities in the SBMH group compared to the non-SBMH group (50% vs. 68%, p<0.001). There were no significant differences between SBMH and non-SBMH groups in their socioeconomic status or number of siblings. Children in the SBMH group had significantly worse mean scores on internalizing (2.22 vs. 1.96, p=0.003), externalizing (2.57 vs. 2.23, p<0.001) and peer relations (2.34 vs. 2.60, p<0.001) sub-scales according to teacher report compared to the non-SBMH group. Interestingly, a smaller proportion of children in the SBMH group compared to the non-SBMH group had only self-identified internalizing problems (11% vs. 23%, p=0.007). As expected, the SBMH group had a larger percentage of children whose caregivers reported that they had concerns with the child's emotional behavior (35% vs. 17%, p<0.001). Slightly more children in the SBMH group received special education services (19% vs. 12%, p=0.016). There were no differences in children's reading or math scores or their stressful life experiences.

Multivariate Regression Results

Demographic Characteristics

When examining the unadjusted relationships between demographic characteristics and receipt of SBMH services in Model 1 (Table 5-2), gender was associated with receipt of care; females had significantly lower odds of receiving care compared to males (OR=0.69; p=0.023). Differences also were noted among ethnic groups. Compared to their white peers, Latino (OR=0.43; p=0.009) and Asian (OR=0.28; p=0.010) children with mental heath needs had significantly lower odds of receiving SBMH services. Significant differences were not observed between socio-economic quintiles or the number of siblings the child had. Parent type was significantly associated with receipt of care. Specifically, as compared to children who lived with

both biological parents, children who lived with one biological parent and another parent (OR=2.68; p<0.001), as well as those who lived with other, non-biological caregivers (OR=4.31; p=0.016) had significantly higher odds of receiving SBMH services. Children who lived with a single biological parent were not significantly different in terms of receiving SBMH services from those who lived with both biological parents.

Mental Health Characteristics, Stressful Life Experiences and Academic Characteristics

Stepwise logistic regression models examined the associations between children's receipt of SBMH, adding in children's mental health characteristics (Model 2), then adding their stressful life experiences (Model 3), and, finally academic characteristics (Model 4; Table 5-2). Fit statistics indicated that the models did not improve with the addition of stressful life experiences and academic characteristics, none of which were significantly associated with the outcome of interest. Thus, Model 2 explained predictors of SBMH services best and is described as follows. As seen in Table 5-2, after adjusting for children's mental health characteristics, there was no longer a relationship between gender or ethnicity and receipt of SBMH services. The differences in odds of receiving services found between children who lived with a biological parent and other non-biological parent compared to those who lived with both biological parents (OR=2.49; p<0.001) remained significant after adjusting for mental health characteristics. However, there were no longer significant differences between those who lived with both biological parents and those who lived with other non-biological caregivers. Caregiver's report that the child had a disability also remained a significant predictor of SBMH service receipt (OR=1.54; p=0.018).

Children identified by teachers as having either externalizing (OR=1.52; p=0.013) or internalizing (OR=1.69; p=0.001) problem behaviors, as well as those who had self-identified externalizing behaviors (OR=1.48; p=0.008), had significantly higher odds of receiving SBMH services. Significant differences were not observed in odds of receiving services for children with either teacher or child-identified peer relation problems, nor self-identified internalizing

behaviors. Nor were parents/caregivers reported concerns with the child's emotional behavior significantly related to receipt of SBMH.

The same stepwise models were conducted by replacing the six sub-scale scores with a new variable that categorized scores by whether they were reported by teachers, children or both. As seen in Table 5-3, after adjusting for demographic characteristics (Model 2), children whose mental health needs were only self-identified (not identified by teachers) had significantly lower odds of receiving services than those whose needs were identified by teachers (OR=0.53; p=0.047). Stepwise models were also run after replacing the sub-scale scores with a composite variable that categorized children with the number of problem scores in the top 15%. As seen in Table 5-3, children with increasing numbers of mental health sub-scale scores in the top 15% had increasing odds of receiving services compared to those with only two scores in the top 15%. Children with six sub-scale scores in the top 15% had the highest odds of receiving SBMH services (OR: 5.25; p=0.026).

Discussion

The most significant predictors of SBMH service receipt were the reported type and level of problem behavior. Children identified by teachers as having either externalizing or internalizing problem behaviors, as well as those who had self-identified externalizing behaviors had significantly higher odds of receiving SBMH services, which is consistent with previous studies (Zahner & Daskalakis, 1997). Moreover, a linear relationship was observed such that as the number of mental health sub-scale scores in the top (worst) 15th percentile increased, children had increased odds of receiving services, compared to children with only two scores in the top 15%. It is encouraging that those with the highest levels of need were most likely to receive services. However, those with lower levels of need are primarily children whose teachers have not identified them as having problem behaviors. In this study, children with self-identified mental health needs that were not also identified by teachers had significantly lower odds of

receiving services than those whose needs were identified by teachers. While this was a small percentage of the sample (11%), children who report distress require evaluation and may benefit from receiving services. It has been shown that teachers are frequently unaware of the distress of children who do not exhibit disruptive behaviors (Bradshaw, Buckley, & Ialongo, 2008; Cunningham & Suldo, 2014).

While it is recognized that the screening tools used by the ECLS-K do not indicate that children have a diagnosable mental disorder, it also is unclear whether they are actually in need of treatment. It is worth noting that children with sub-threshold mental health problems often have significant impairment in functioning (Costello et al., 2003), and a recent longitudinal follow up study demonstrated that those with sub-threshold mental health problems had increased odds of adverse adult outcomes (Copeland, Wolke, Shanahan, & Costello, 2015). Therefore, efforts to identify children with less prominent symptoms might be beneficial, including increasing children's awareness of services and encouraging them to self-refer, as well as efforts to further increase teachers' recognition of children's mental health needs.

Based on previous literature, it was hypothesized that there would be demographic differences among children with mental health needs who received and did not receive SBMH services. Previous research demonstrated that both child gender and family SES are related to SBMH service receipt, however, after adjusting for the type of mental health problems, these factors were not associated with receipt of school based mental health services in this sample of youth with mental health needs. Furthermore, although minority youth have been found to receive mental health services at lower rates than their peers (Alegria et al., 2012; Chow et al., 2003), no significant differences were observed between White children and those of other racial/ethnic groups in the current study after adjusting for level of mental health need, suggesting that the latter is a stronger predictor.

In a recent study of predictors of mental health service use, Langer et al (2015) found that parent ratings of youth mental health impairment were the strongest predictors of service use in

the school setting, however that was also not observed in this study. This is likely because caregiver report in this study was based on reported concerns about children's emotional behavior, rather than specific mental health impairment. Furthermore, a previous study of the full ECLS-K third grade sample found an association between special education and SBMH service receipt, although the study did not account for children's mental health needs (Reback, 2010). In this sample of students with mental health needs, this association was not observed suggesting that it may actually be the need for care that is driving entry into services rather than special education status.

There are several limitations to this study that warrant consideration. First, given that not all teachers are trained to identify children with mental health needs and not all children are comfortable sharing or able to recognize their own needs, reporter bias is a concern when defining the sample of children with mental health needs. There also may have been variation between reporters on how they assessed problem behaviors with some teachers or children possibly rating problem behaviors more or less severely than others. These biases may have led to some children being excluded from the sample of youth with mental health needs, or others being included who did not have mental health needs, with those identified by youth report only likely under-identified. This study is also limited to those students whose teachers indicated that they are receiving mental health services during the school day. However, some teachers may incorrectly report that children received mental health services when they actually receive other support services. Furthermore, due to the survey design and the manner in which questions about children's mental health services were posed to parent interview respondents, it was not possible to determine if children received mental health services outside of the school setting.

Despite these limitations, the study findings add to the scant literature on child and family level predictors of students' receipt of SBMH services. Further studies would benefit from examining additional child and family level characteristics, including additional academic indicators and child- and parent-reported problem behaviors, to further elucidate who is receiving

SBMH services and who may not be receiving needed mental health services. Untreated mental health problems have been linked to significant negative consequences in adulthood, including unemployment, substance abuse and suicide. Early interventions are critical to change these negative trajectories, and schools play a key role in identification of youth who require care, as well as in the provision of services once youth are identified. Understanding what leads children to obtain SBMH services can help to ensure that youth with mental health needs receive the necessary support services to help them succeed.

Figure 5-1 Conceptually Based Analytic Model to Examine Child and Family Level Characteristics Associated with SBMH Service Receipt

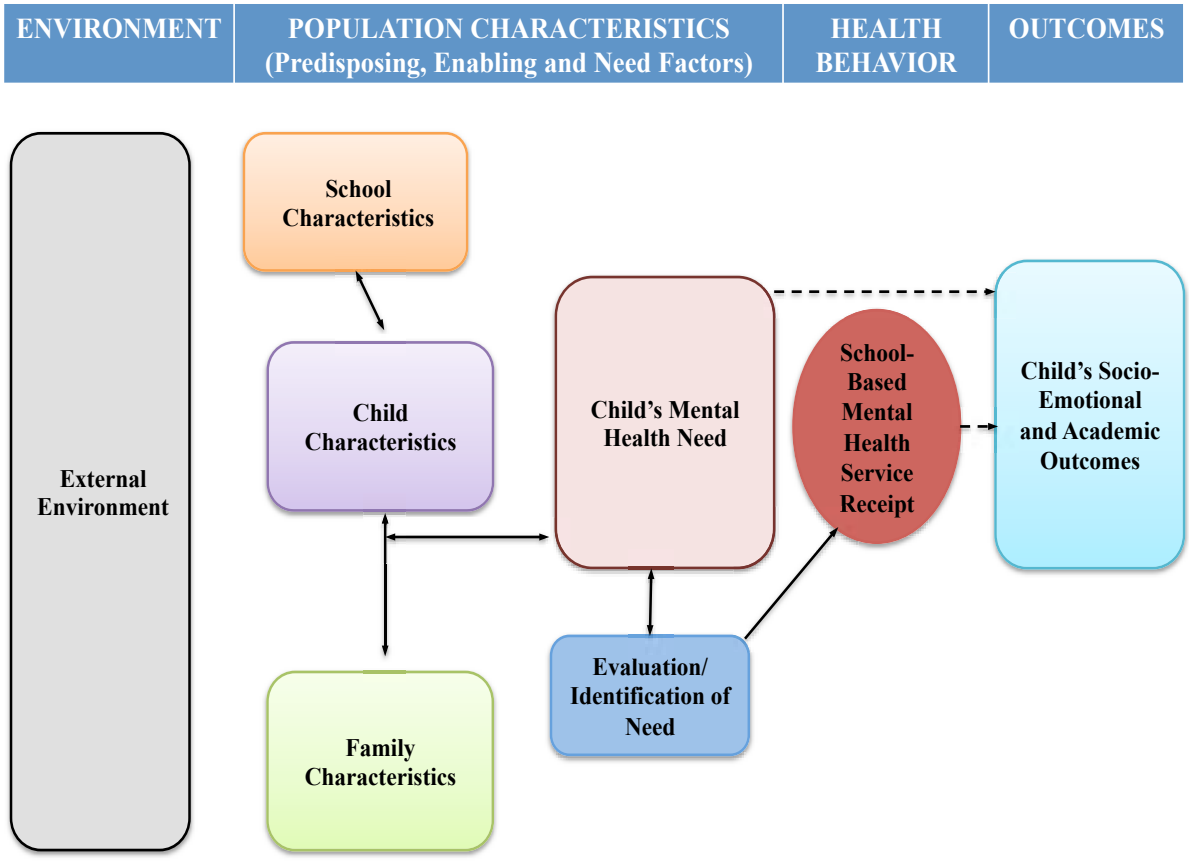

Table 5-1 Weighted Sample Characteristics

	Received SBMH (n=179,961)	Did not receive SBMH (n=532,142)	P value
DEMOGRAPHIC CHARACTERISTICS			
Gender			0.007
Male	70% (126,341)	61% (322,583)	
Female	30% (53,620)	39% (209,559)	
Ethnicity			0.004
White	59% (106,199)	44% (236,698)	
African American	19% (33,996)	24% (128,562)	
Latino	15% (26,196)	24% (126,274)	
Asian	1% (1,607)	3% (16,668)	
Native American	4% (6,574)	2% (7,960)	
Multi/Other	3% (5,389)	3% (15,980)	
Socio-economic status (SES)			0.777
First quintile	29% (51,402)	28% (148,734)	
Second quintile	24% (42,485)	25% (132,529)	
Third quintile	25% (44,623)	21% (111,929)	
Fourth quintile	13% (23,747)	16% (87,229)	
Fifth quintile	10% (17,705)	10% (51,721)	
Parent type			<0.001
Biological parents	33% (59,152)	47% (252,043)	
One biological parent and one other parent	28% (50,005)	15% (79,673)	
Single biological mother or father	29% (52,013)	32% (168,114)	
Other	10% (18,790)	6% (32,312)	
Number of siblings			0.267
None	19% (33,826)	17% (90,084)	
One	41% (73,042)	38% (203,770)	
Two	21% (37,823)	29% (153,118)	
Three or more	20% (35,269)	16% (85,170)	
Caregiver reported child has disability			<0.001
Yes	50% (89,161)	32% (167,042)	
No	50% (90,240)	68% (358,461)	
MENTAL HEALTH CHARACTERISTICS			
Score (# sub-scales in top 15%)			<0.001
2	37% (67,105)	58% (306,847)	
3	33% (59,717)	27% (143,651)	
4	20% (35,537)	12% (63,912)	
5	7% (12,260)	3% (14,660)	
6	3% (5,342)	1% (3,072)	
Reporter			0.005
Teacher only reported scores in top 15% in ≥2 sub-scales	28% (49,960)	24% (127,943)	
Child only reported scores in top 15% in ≥2 sub-scales	11% (18,999)	23% (122,054)	
Teacher and child reported scores in top 15% in ≥2 sub-scales	62% (111,002)	53% (282,145)	
Teacher reported problem scales (mean score; range 1-4)			
Internalizing behaviors	2.22 (SE=0.053)	1.96 (SE=0.024)	0.003
Externalizing behaviors	2.57 (SE=0.058)	2.23 (SE=0.026)	<0.001
Peer relations (reversed score, lower is worse)	2.34 (SE=0.044)	2.60 (SE=0.024)	<0.001
Child reported problem scales (mean score; range 1-4)			
Internalizing behaviors	2.60 (SE=0.067)	2.73 (SE=0.031)	0.007
Externalizing behaviors	2.64 (SE=0.070)	2.57 (SE=0.033)	0.455
Peer relations (reversed score, lower is worse)	2.81 (SE=0.067)	2.78 (SE=0.025)	0.929
Caregiver reported concerns about child's emotional behavior			<0.001
Yes	35% (63,677)	17% (88,296)	
No	65% (115,724)	83% (432,838)	
STRESSFUL LIFE EXPERIENCES			
Number of places child lived for 4+ months since 1st grade			0.155
One place	86% (148,587)	82% (424,237)	
Two or more places	14% (23,407)	18% (93,122)	
Child changed schools since 1st grade			0.431
Yes	36% (63,431)	33% (167,410)	
No	64% (110,480)	67% (344,225)	
Caregiver's depressive symptoms (mean score; range=12-48)	18.14 (SE=0.493)	17.82 (SE=0.273)	0.617

	Received SBMH (n=179,961)	Did not receive SBMH (n=532,142)	P value
ACADEMIC CHARACTERISTICS			
Receives Special Education			0.016
Yes	19% (33,936)	12% (63,491)	
No	81% (144,230)	88% (468,651)	
Math IRT Score (mean score; range=36-163)	90.61 (SE=1.94)	91.08 (SE=1.00)	0.692
Reading IRT Score (mean score; range=51-189)	113.94 (SE=1.93)	116.98 (SE=1.34)	0.238
SE=standard error *Children with one sub-scale score in the top 15% were not eligible for this study.			

Table 5-2 Multivariate Associations Between Individual and Family Characteristics and Children's Receipt of SBMH Services [AOR: Adjusted Odds Ratio (CI: 95% Confidence Interval)]

	Model 1			Model 2			Model 3			Model 4		
	AOR	CI	P value	AOR	CI	P value	AOR	CI	P value	AOR	CI	P value
DEMOGRAPHIC CHARACTERISTICS												
Gender (ref=male)												
Female	0.69	0.50-0.95	0.023	0.85	0.61-1.18	0.357	0.87	0.62-1.21	0.408	0.88	0.63-1.22	0.446
Ethnicity (ref=White)												
Afr. Am.	0.64	0.35-1.18	0.149	0.64	0.36-1.15	0.139	0.65	0.36-1.15	0.134	0.64	0.35-1.15	0.137
Latino	0.43	0.23-0.81	0.009	0.56	0.29-1.08	0.087	0.56	0.29-1.08	0.081	0.55	0.29-1.05	0.072
Asian	0.28	0.11-0.74	0.010	0.41	0.16-1.07	0.069	0.41	0.15-1.07	0.068	0.40	0.15-1.07	0.067
Native Am.	1.34	0.70-2.56	0.378	1.77	0.85-3.70	0.126	1.88	0.90-3.92	0.093	1.82	0.88-3.75	0.106
Multi/Other	0.69	0.24-2.03	0.502	0.83	0.27-2.57	0.746	0.84	0.27-2.62	0.768	0.86	0.28-2.67	0.791
SES quintile (ref=first)												
Second	0.78	0.44-1.37	0.374	0.81	0.46-1.46	0.488	0.80	0.45-1.43	0.457	0.81	0.46-1.45	0.484
Third	0.95	0.53-1.69	0.859	1.01	0.56-1.82	0.972	0.99	0.54-1.79	0.969	1.01	0.55-1.85	0.965
Fourth	0.59	0.29-1.19	0.139	0.67	0.33-1.37	0.270	0.67	0.33-1.36	0.265	0.69	0.34-1.39	0.298
Fifth	0.65	0.31-1.36	0.240	0.72	0.35-1.49	0.376	0.68	0.33-1.43	0.311	0.72	0.34-1.53	0.390
Parent type (ref=biological parents)												
One bio. and other parent	2.68	1.79-4.02	<0.001	2.49	1.67-3.70	<0.001	2.53	1.70-3.77	<0.001	2.52	1.68-3.76	<0.001
Single bio. mom or dad	1.39	0.88-2.18	0.156	1.16	0.72-1.88	0.545	1.16	0.72-1.87	0.547	1.16	0.71-1.87	0.556
Other	4.32	1.32-14.16	0.016	2.98	0.90-9.85	0.073	2.80	0.84-9.30	0.092	2.80	0.84-9.34	0.093
# siblings (ref=none)												
1	1.15	0.72-1.85	0.562	1.18	0.73-1.91	0.495	1.18	0.73-1.90	0.494	1.17	0.72-1.88	0.528
2	0.95	0.56-1.61	0.854	0.94	0.54-1.63	0.833	1.00	0.57-1.73	0.988	0.99	0.57-1.72	0.967
≥3	1.74	0.88-3.45	0.114	1.62	0.83-3.18	0.158	1.64	0.83-3.22	0.152	1.57	0.80-3.08	0.186
Caregiver reported child has disability	1.97	1.44-2.69	<0.001	1.54	1.08-2.19	0.018	1.51	1.06-2.14	0.025	1.46	1.02-2.08	0.036
MENTAL HEALTH CHARACTERISTICS												
Teacher reported	-	-	-									
Internalizing behaviors				1.69	1.24-2.31	0.001	1.69	1.24-2.33	0.001	1.68	1.23-2.31	0.001
External behaviors				1.52	1.09-2.11	0.013	1.51	1.09-2.10	0.012	1.52	1.10-2.09	0.011
Peer relations*				0.78	0.52-1.16	0.214	0.78	0.53-1.17	0.217	0.79	0.53-1.18	0.250
Child reported	-	-	-									
Internalizing behaviors				0.81	0.60-1.09	0.173	0.81	0.60-1.09	0.165	0.80	0.58-1.09	0.160
External behaviors				1.48	1.11-1.98	0.008	1.48	1.10-1.98	0.009	1.47	1.10-1.98	0.010
Peer relations*				1.08	0.84-1.39	0.562	1.07	0.83-1.38	0.586	1.06	0.82-1.37	0.665
Caregiver concerns about child's emotional behavior	-	-	-	1.54	0.97-2.45	0.069	1.55	0.95-2.54	0.078	1.56	0.96-2.53	0.072
STRESSFUL LIFE EXPERIENCES												
# places lived for 4+ months since 1st grade (ref=one)	-	-	-	-	-	-	0.74	0.46-1.20	0.220	0.74	0.46-1.20	0.223
≥2 places												
Changed schools since 1st grade	-	-	-	-	-	-	1.12	0.73-1.72	0.608	1.12	0.73-1.73	0.597

	Model 1			Model 2			Model 3			Model 4		
	AOR	**CI**	**P value**	**AOR**	**CI**	**P value**	**AOR**	**CI**	**P value**	**AOR**	**CI**	**P value**
Caregiver's depressive symptoms	-	-	-	-	-	-	1.00	0.97-1.03	0.920	1.00	0.97-1.03	0.937
ACADEMIC CHARACTERISTICS												
Received Special Education	-	-	-	-	-	-	-	-	-	1.07	0.64-1.79	0.790
Math IRT Score	-	-	-	-	-	-	-	-	-	1.00	0.99-1.01	0.941
Reading IRT Score	-	-	-	-	-	-	-	-	-	1.00	0.99-1.01	0.626
Wald test (p value)	--			p<0.0001			.6499			0.9246		

Ref=reference group; *=reversed score, lower is worse
All models adjusted for respondents' relationship to child, number of siblings, and school characteristics (region, urbanicity, Title 1 status, enrollment, counseling staff FTE).

Table 5-3 Multivariate Associations Between Children's Receipt of SBMH Services and Problem Scale Scores and Reporter Type [AOR: Adjusted Odds Ratio (CI: 95% Confidence Interval)]

	Model 1			Model 2			Model 3			Model 4		
	AOR	CI	P value	AOR	CI	P value	AOR	CI	P value	AOR	CI	P value
MENTAL HEALTH CHARACTERISTICS												
Score (# sub-scales in top 15%; ref=2)	-	-	-									
3				1.68	1.10-2.55	0.016	1.63	1.08-2.48	0.021	1.63	1.08-2.45	0.021
4				2.12	1.38-3.26	0.001	2.08	1.36-3.18	0.001	2.08	1.35-3.21	0.001
5				3.32	1.48-7.42	0.004	3.39	1.50-7.65	0.004	3.35	1.45-7.72	0.005
6				5.25	1.23-22.33	0.026	5.21	1.22-22.38	0.028	5.19	1.19-22.70	0.031
Reporter (ref=teacher only)	-	-	-									
Child only				0.53	0.28-0.99	0.047	0.53	0.28-0.99	0.047	0.53	0.28-0.99	0.047
Teacher and child reported				0.90	0.57-1.43	0.656	0.91	0.59-1.43	0.694	0.90	0.58-1.42	0.663

Ref=reference group
All models adjusted for respondents' relationship to child and school characteristics (region, urbanicity, Title 1 status, enrollment, counseling staff FTE).

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Chapter 6: Children's Receipt of School-Based Mental Health Services and Their Socio-Emotional and Academic Outcomes

Introduction

Nationwide, an estimated one out of five children suffers from mental, emotional, or behavioral disorders, yet most of these children do not receive services to address these needs (Kataoka et al., 2002; Merikangas, He, Brody, et al., 2010; Merikangas et al., 2011). There are many components of mental health care systems that lead to barriers, such as limited providers, cost, location, lack of transportation, and inconvenient hours (Owens et al., 2002; Samargia et al., 2006). School-based mental health (SBMH) services overcome many of these barriers by bringing services to youth in a familiar setting regardless of their ability to pay (Bringewatt & Gershoff, 2010). For many children who receive mental health care, the public school system is their sole provider of services (Hoagwood & Erwin, 1997; Hoagwood & Johnson, 2003; Merikangas, He, Brody, et al., 2010).

There is an emerging, though limited, body of research examining the impacts of SBMH services on youth's mental health, including internalizing and externalizing behaviors (Hoagwood et al., 2007). In one study of elementary school children who were experiencing severe emotional and behavioral difficulties and who received SBMH services, statistically significant reductions were found in conduct disordered behavior, attention deficit-hyperactivity, and depressive symptomatology approximately one year later (Hussey & Guo, 2003). Another study of children ages 5 to 18 years with severe emotional disorders and receiving SBMH services found that 51% of the study participants had reduced symptoms at 9-month follow-up and 28% had symptoms that returned to limits below clinical levels of disorder (Robinson & Rapport, 2002). In a study examining elementary school finance policies, after controlling for children's academic indicators in kindergarten, greater availability of school-site elementary counseling services was associated with improved mental health and behavior among third grade students (Reback, 2010).

Yet, the majority of studies examining the impacts of SBMH programs do not include an examination of academic outcomes, and among those that do, most have found mixed results

(Becker, Brandt, Stephan, & Chorpita, 2014b; Bruns et al., 2005; Lyon et al., 2013). In their review of more than 2,000 articles on empirically-based studies of SBMH interventions published between 1990 and 2006, Hoagwood and colleagues (2007) identified only 64 with strong methodological rigor. Six of these articles focused on treatment programs in elementary schools and examined both mental health and educational outcomes (Hoagwood et al., 2007). While all six studies found positive effects in mental health outcomes, none demonstrated effects on educational outcomes. One more recent study of SBMH programs offered in elementary schools found decreased suspensions and improved attendance among children who received services compared to a matched group of students who did not receive services (Ballard et al., 2014). Another recent study of children aged 6 to 17 years who were enrolled in individual-based SBMH services reported small changes in attendance and suspensions and slight improvements in grade promotion compared to students receiving classroom-based support services (Kang-Yi et al., 2013).

Despite these findings suggesting that SBMH programs have the potential to affect academic and mental health outcomes, the small number of studies and their methodological challenges, including lack of well-matched comparison groups and limited follow-up periods, limit their generalizability. Furthermore, the majority of these studies were not population-based and used convenience samples. This study aims to overcome some of these challenges by examining outcomes associated with receipt of SBMH services two years following receipt of those services in a national sample with a matched comparison group using propensity score methods. Specifically, this study examines whether youth with mental health needs who receive SBMH services in third grade have improved socio-emotional and academic outcomes at fifth grade follow-up, compared to a matched group of peers who did not receive SBMH services in third grade.

Conceptual Model

Figure 6-1 provides a conceptual model depicting factors that influence children's mental health need, receipt of SBMH services, and subsequent mental health and educational outcomes. This model is based on an early version of Andersen's Behavioral Model of Health Services Use (Aday & Andersen, 1974), which categorized "population characteristics" into three types of individual and contextual determinants of health services use: 1) predisposing factors, 2) enabling factors; and 3) service need factors (R. M. Andersen, 1995; R.M. Andersen, 2008). Individual predisposing factors include characteristics that exist prior to an individual's experience of a health services need, such as gender, ethnicity and socioeconomic status. Enabling factors include conditions that allow an individual to access services, such as availability of school-based services and health insurance. Need factors can include the individual's perceived need for services, as well as the evaluated need. This conceptual model guides the selection of factors to characterize children with a propensity to receive SBMH services and supports the examination of subsequent outcomes for those who do and do not receive services. While the external environment also influences outcomes, it is not a focus of this study.

Methods

Study Sample

Data for this study came from the *Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K),* conducted by Westat and developed under the sponsorship of the U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (Tourangeau et al., 2009). The ECLS-K followed a nationally representative cohort of children from kindergarten into middle school. Data were collected in kindergarten and first, third, fifth and eighth grades on children's cognitive, social, emotional, and physical development, as well as their home, school and classroom environments, classroom curriculum, and teacher qualifications. Data were obtained from interviews with parents, self-administered questionnaires

from principals and teachers, student records abstracts, and direct child assessments and questionnaires. This study uses data collected in the first (2000), third (2002) and fifth (2004) grade spring survey administrations.

The sample for the current study included only children whose teachers responded to a question about whether the child received SBMH services in third grade, given that this is the treatment variable of interest; attended public schools in first and third grade, given that SBMH service structure differs in private settings; and had data on mental health indicators in first grade (pre-treatment) and fifth grade follow-up (post-treatment). Figure 6-2 provides an overview of how the study sample was selected.

Children were identified as having a potential mental health need if they were in the top approximately 15% of teacher reported assessment scores on internalizing and externalizing behaviors in the first grade. This percentage is consistent with estimates of prevalence of mental health disorders in preschool and school-age children (Costello et al., 2003; Egger & Angold, 2006; Lavigne, Lebailly, Hopkins, Gouze, & Binns, 2009; Merikangas, He, Brody, et al., 2010). Teachers' assessments of mental health need were based on reported mean scores on the internalizing and externalizing behavior domains of the ECLS-K's Teacher Social Rating Scale (SRS), which was adapted from the Social Skills Rating Scale: Elementary Scale A instrument (Gresham & Elliott, 1990). The split-half reliability for the Teacher SRS scores were 0.89 for the externalizing problem behaviors sub-scale and 0.76 for the internalizing problem behaviors (Tourangeau et al., 2009).

Due to natural breaks in the data, children in the top 12% of internalizing behaviors (n=378) and those in the top 17% of externalizing behaviors were identified as having mental health needs (n=584); 215 additional children had scores in both the top 12% of internalizing and top 17% of externalizing behaviors. The final analytical sample comprised 1,177 children with high mental health need, 223 of whom received SBMH services and 954 who did not receive

SBMH services. This total sample represented 12% of the original ECLS-K cohort of children who attended public schools in first and third grade.

Measures

Independent/treatment variable: The treatment variable was receipt of SBMH services in the third grade. Service receipt was based on teachers' responses to the question, "*Does this child receive instruction and/or related services in any of the following types of programs in your school during the school day?... Individual or group counseling from a trained professional."* Responses were coded as a dichotomous variable (0=no, 1=yes), with those who responded "program not offered" or with missing data excluded from the sample.

Matching variables. Thirty-three covariates assessed in the first grade (pre-treatment) were included in the propensity score model to characterize ECLS-K first graders in the top (worst) 15% of mental health problems according to their teachers. The covariates are summarized in Table 6-1.

Child and family characteristics: Prior research suggests that child and family level factors associated with mental health service use include age, gender, ethnicity, socioeconomic status, parental education, marital status, and family structure (Alegria et al., 2012; Chow et al., 2003; Merikangas, He, Burstein, et al., 2010; Zahner & Daskalakis, 1997). Thus, these variables were included as covariates. Other child and family level covariates measured included the number of times the child had changed schools; the number of places the child had lived for four months or more since the last survey administration; parent type (i.e., biological mother or adoptive parent); parent report of whether the child had a disability (i.e., hearing, vision, emotional); number of siblings; and health insurance.

Caregiver involvement: Caregivers responded to a series of questions about activities in which they participated at the child's school, such as attending open houses and parent teacher conferences; how often they participated in activities at home with their children, such as telling stories, singing songs, and reading books; and how often they engaged with their children,

including whether they discussed the child's friends and activities. Responses to each subject area were combined to create mean or total scores to then match children on caregiver involvement, which can protect children from developing mental health concerns (Wenk, Hardesty, Morgan, & Blair, 1994).

Socio-emotional indicators: Data from children's first grade survey administration on five teacher reported socio-emotional sub-scales (approaches to learning, interpersonal skills, internalizing behaviors, externalizing behaviors, and self-control) were included as covariates to match children on their pre-treatment levels of mental health need and peer relations. Scores on two of these scales (internalizing and externalizing behaviors) were those used to identify the study sample of students with scores in the top 15%. However, the actual scores on these measures were also used as pre-treatment balancing variables in the propensity score models. Similar data was used from parent report on five sub-scales: children's approaches to learning, self-control, social interactions, impulsive/overactive behaviors and internalizing behaviors (Tourangeau et al., 2009).

Academic characteristics: Receipt of special education was included as a covariate, given that a previous study found that special education receipt was highly correlated with receipt of SBMH services in the ECLS-K sample (Reback, 2010). Children's reading and math scores were also included based on previous research that children's mental health can impact their academic performance (Duncan & Manguson, 2009; Webster-Stratton et al., 2008).

School characteristics: School level variables were included in the model as they were shown to relate to access to SBMH services in the ECLS-K (in this dissertation), as well as previous literature on SBMH services, including region (south, west, northeast, midwest); urbanicity (urban, suburban, rural); school enrollment; percent minority in the school; and whether the school received Title 1 funds.

Outcome variables. Outcomes were assessed using change scores that were derived by subtracting children's mental health indicator scores at the third grade survey administration from

their scores in fifth grade. A larger, positive change score would indicate greater improvements in mental health indicators. Specifically, children's change scores on teacher rated internalizing and externalizing behaviors were examined, as well as self-assessed scores on internalizing and externalizing behaviors. Teacher ratings of internalizing and externalizing behaviors were assessed in third and fifth grade with the Teacher Social Rating Scale described previously. Child self-assessments of these behaviors were measured with the Child Self-Description Questionnaire (SDQ), which was developed specifically for the ECLS-K (Tourangeau et al., 2009). The SDQ scale reliabilities (alpha coefficients) were: 0.77 for externalizing behaviors and 0.81 for internalizing behaviors (Tourangeau et al., 2009). Changes in academic indicators were calculated in a similar fashion by subtracting students' Item Response Theory (IRT) scores on math and reading domains in the third grade from fifth grade scores to obtain gains in scores. In the original ELCS-K study, IRT scores were recorded for each child based on how he/she responded to a battery of developmentally-appropriate educational assessments administered by ECLS-K researchers. The ECLS-K researchers recommended use of the IRT scores to assess changes in children's performance over time. Finally, children's total days absent and days tardy in fifth grade were examined as separate outcomes (third grade data on these measures were not available in the ECLS-K public dataset).

Analyses

Descriptive statistics and multivariate regression. Descriptive statistics and chi-square tests were conducted to compare demographic differences between children with mental health needs who received SBMH services and those who did not. Multivariate analysis of the unmatched analytical sample was initially conducted using linear regression to assess effects of SBMH service receipt on outcomes and to serve as a sensitivity analysis to compare subsequent propensity score method results. Analytical models were adjusted for the number of full and part-time school counseling or psychological staff at the school due to previous research linking

receipt of services with availability (Anglin et al., 1996; Kaplan et al., 1998). Analyses were conducted in Stata13 (Stata Corporation, 2015).

Propensity score matching. Randomly assigning children to receive or not receive SBMH services is unlikely, given ethical concerns that children presenting with mental health concerns should be provided care when needed. Thus, studies assessing the effects are typically observational. Propensity score techniques can address potential confounding in observational studies by improving the comparability in treated and control groups (Dugoff et al., 2014). The propensity score method reduces bias through the use of observed background characteristics (covariates) while also controlling for multi-collinearity by accounting for all the indicator variables in one score (Stuart, 2010). Propensity score methods are based on an assumption of no unmeasured confounders when subjects are matched on an appropriate and comprehensive set of observed characteristics.

Propensity score based full matching was conducted using the MatchIt program in the R statistical package (R Core Team, 2015). The full matching approach allows all subjects to be retained in the data analysis sample by grouping individuals into matched sets comprised of at least one treated individual and at least one comparison individual with similar propensity scores (Stuart & Green, 2008). Other matching methods, including greedy and optimal matching, were also conducted, however neither performed as well in diagnostic checks of covariate balance (results available upon request). The analytical study sample consisted of 223 treated individuals and 954 control individuals who did not receive SBMH services, all of whom were retained in the matched analysis sample. To estimate propensity scores, a multivariable logistic regression model was used with SBMH service receipt as the dependent variable. The propensity score model used the 33 covariates described above. Next, the performance of the full matching method was assessed through a variety of diagnostic checks, including an examination of each observed covariate's balance before and after matching as determined by visual plots of propensity score distribution, the reduction in standardized mean differences for each variable, and the

standardized bias (Table 6-2; Figures 6-3, 6-4 and 6-5). Standardized biases of less than 0.10 were considered good matches.

After propensity score matching was completed, weighted logistic regression incorporating full matching propensity score weights in Stata was used to estimate the association of treatment (SBMH service receipt) with socio-emotional and academic outcomes within the matched sample. The estimand of interest in this analysis was the study sample average treatment effect on the treated (SATT), or the average effect for children who actually received the treatment. All regression models were adjusted for the number of school counseling or psychological staff at the school in the third grade since this could have affected access to treatment and outcomes.

Given the ECLS-K's complex survey design, Stata's survey commands were then used to account for the clustered sampling design by incorporating weights into regression models (Dugoff et al., 2014). By accounting for the complex survey design, results can be generalized to the original target population. Weighted logistic regression incorporating full matching propensity score weights and survey design weights was conducted to assess the population average treatment effect on the treated (PATT) within this sub-sample of children with mental health needs from the original ECLS-K target population.

Results

Figure 6-2 depicts how the sample was selected for this study. Among the children with complete data on study variables of interest (n=5,130), 11% (n=577) had received SBMH services in third grade. Among these children, 39% had pre-treatment teacher reports of internalizing and externalizing behaviors in the top 15% of scores. One-fifth (21%) of children who did not receive SBMH services had pre-treatment scores in the top 15%.

Table 6-3 presents pre-treatment characteristics of the sample of children who received and did not receive SBMH services in third grade without adjusting for survey design or

matching (study sample), as well as the population of children (weighted sample) with mental health needs who received and did not receive SBMH services.

Within the study sample of children with mental health needs, slightly more males received SBMH services compared to the non-SBMH group (65% vs. 59%, p=0.016). There were also significantly more children whose parents reported they had a disability (32% vs. 21%, p=0.001) and who had changed schools since kindergarten (6% v. 3%, p=0.020). SBMH treated children in the study sample also had significantly lower scores on all teacher and parent-reported sub-scales of socio-emotional indicators, except for parent-reported approaches to learning. SBMH children in the study sample were slightly less likely to receive special education (7% vs. 11%, p=0.026), but they had significantly lower reading (71.3 vs. 75.3, p=0.014) and math scores (56.4 vs. 60.4, p=0.001). More SBMH treated children attended schools with enrollments of fewer than 500 students (60% vs. 49%, p=0.045). No other significant differences were found in children's observed pre-treatment characteristics.

Within the weighted population sample, no significant differences were found by gender or for children who changed schools. However, significant differences were found by ethnicity, with SBMH children comprising more Latino children (17% vs. 8%) and fewer African American children (17% vs. 24%, p=0.038). Differences among parent report of disability remained significant, with 40% of SBMH children reportedly having a disability compared to 22% of non-SBMH children (p=0.001). More SBMH children also had parents who were not married compared to non-SBMH children (45% vs. 31%, p=0.035). No significant differences were found in socio-emotional indicators, except for teacher reported approaches to learning (2.44 vs. 2.63, p=0.015). SBMH children in the population sample were slightly more likely to receive special education (15% vs. 8%, p=0.026). Similar to the study sample, more SBMH children in the weighted population sample attended schools with enrollments of fewer than 500 students (60% vs. 49%, p=0.024). No other significant differences were found in children's observed pre-treatment characteristics within the weighted population sample.

Table 6-4 presents the average treatment effects for treated children in this study. Results from all three analyses yielded null findings for differences in changes scores for nearly all outcomes. Findings that were significant indicated that children with mental health needs who received SBMH services had significantly smaller improvements compared to peers with mental health needs who did not receive SBMH services. Children who received SBMH services in all three samples had significantly lower change scores on their teacher-reported externalizing behaviors (ATT=-0.211; SATT=-0.240; PATT=-0.206). In the population estimates, children who received SBMH services had slightly lower gains in reading (-5.72) and math (-3.76) IRT scores from third grade to fifth grade compared to the matched sample of students who did not receive services.

Discussion

A large portion of children receiving SBMH services in the third grade study sample (38%) had indicators of mental health need in the top 15% of teacher reported scores pre-treatment (first grade). This equated to 23% of children in the population based estimates, thus demonstrating that only a small portion of children with needs received services in the school setting. The majority of children receiving SBMH services had low levels of teacher reported mental health need, which warrants further investigation to determine which characteristics lead to these children entering services. There was also a large proportion of children with high mental health needs who were not receiving SBMH services and could possibly benefit from services. Given their high level of need, additional research is needed to determine whether they may be receiving services elsewhere which was not possible to assess in this study.

The group of children with high needs who were not receiving SBMH services served as a comparison group to examine how those who were receiving SBMH services differed and whether there were any effects of services at two-year follow-up. Population based estimates demonstrated that children receiving SBMH services were more likely to be Latino; they were

less likely to be African American and to have parents who were not married. This is consistent with previous research suggesting that ethnicity and parents' marital status influence receipt of mental health care in general (Alegria et al., 2012; Chow et al., 2003). Children who received SBMH services were also more likely to have a disability according to parent report, to receive special education services, and to have lower teacher ratings of approaches to learning (i.e., attentiveness, organization and learning independence). These findings may indicate that these children are receiving services because, in addition to their internalizing/externalizing problems, there is a need to address these potential learning-related problems, which is certainly important in the school setting. It is also possible that those with disabilities have parents who are more aware of their overall needs and are more inclined to get them into services. Moreover, these findings indicate that children who have concerns that are interfering with their learning, in addition to mental health concerns, are more likely to receive SBMH services. This warrants further investigation, which is beyond the scope of the current study. Significant differences between other pre-treatment indicators related to mental health need were not found in the population-based estimates.

When examining changes in socio-emotional indicators over time among children with high mental health needs who received and did not receive SBMH services, significant differences were not found, except in teacher reported externalizing behaviors. Improvements in teacher reported scores in this domain were smaller for children who received treatment compared to those who did not. Gains in children's reading and math scores were also smaller for treated children. Several factors may be affecting these results. First, children in the SBMH group were experiencing other challenges, including disabilities related to vision, hearing and/or communication according to parent report. Thus, it is possible that they had higher needs than children in the non-SBMH group which could not be fully addressed. Second, children were selected for this sample based on pre-treatment mental health needs identified by teachers in the spring of first grade, yet teacher report of service receipt was assessed in the spring of third grade.

It is possible that some children received other services between the data collection time points, which would bias the observed effects of services. Finally, the propensity score matching was designed to equate the high needs children who were and were not treated in SBMH. The worse outcomes for those in treatment indicates that the matching may not have been successful, i.e, there was residual variance in the propensity of getting into SBMH care that distinguished those who got into services given that their treatment is associated with poorer outcomes relative to others with high mental health need according to teachers.

There are several limitations to this study. The first, the potential for unmeasured characteristics associated with entry into SBMH was addressed above. Additionally, it is possible that unmeasured pre-treatment characteristics may have affected the outcomes. For example, lack of information on whether children in this study received services outside of the school setting to address mental health needs, which could influence outcomes, is problematic. Moreover, there is no way to determine the frequency, duration or quality of services students received, which could have also affected the study outcomes. The ECLS-K only asked teachers to report whether children received SBMH services, however there was no measure of how long or how often children received these services. Finally, the analytical sample comprised a small portion of children from the original ECLS-K cohort due to a large amount of missing data. The resulting estimates may be biased despite the weighting back to the population and the smaller sample size leads to a loss of power.

Despite these limitations, this study provides one of the first examinations of outcomes associated with receipt of SBMH services in a matched population-based sample. While the study did not identify positive changes in children's mental health and academic indicators over time, it helps to lay a foundation for future studies that seek to examine impacts of SBMH services on a population level.

Previous research demonstrates that children with mental health needs are most likely to receive services to address those needs in the school setting and that these services can be

effective in supporting children's development. Further research is needed to accurately document the effects of these services on children's mental health and academic outcomes. Even in a representative sample such as the ECLS-K, such research will not be productive until there are adequate data to understand the level of children's mental health need for treatment and the range, frequency, and intensity of services in and outside of school.

Figure 6-1 Conceptual Model to Examine Effects of SBMH Services on Children's Socio-Emotional and Academic Outcomes in a Matched Sample of Children with Pre-Treatment Mental Health Needs

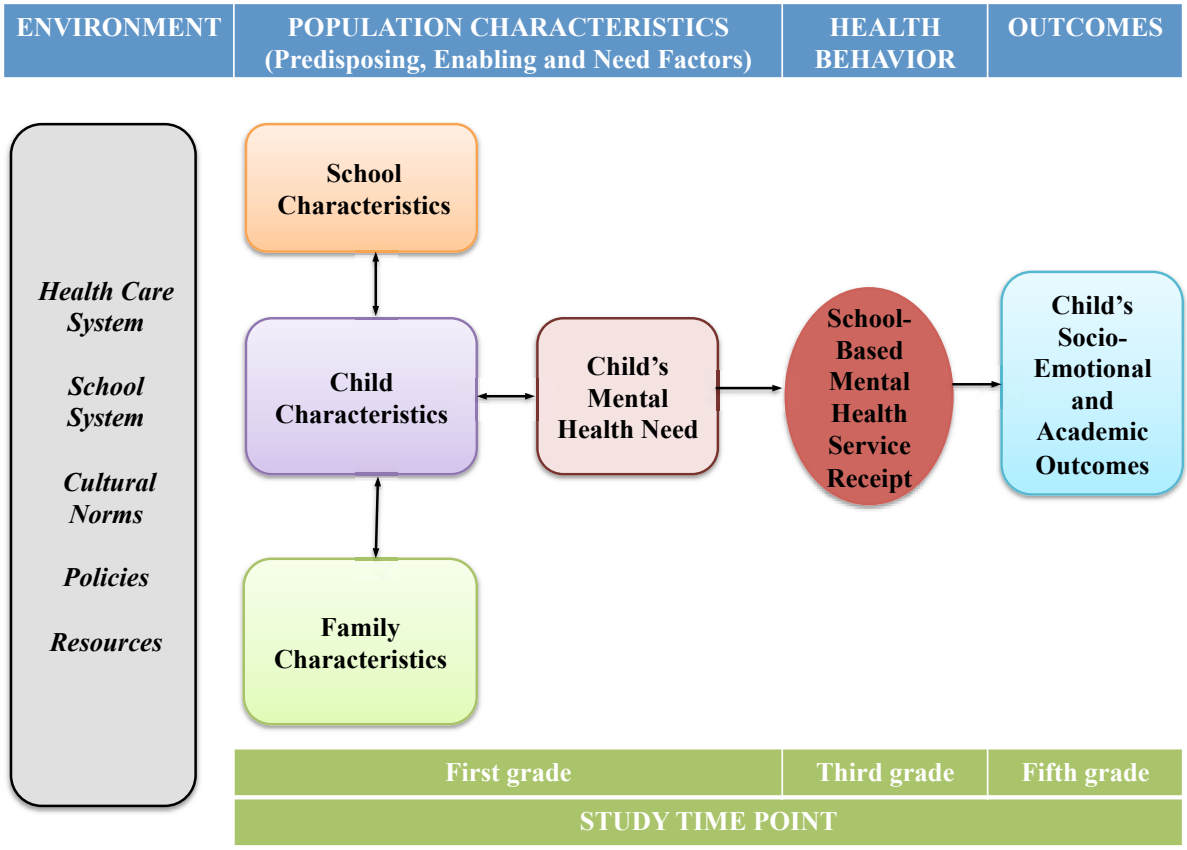

Figure 6-2 Sample Selection Flow Diagram for Aim 3

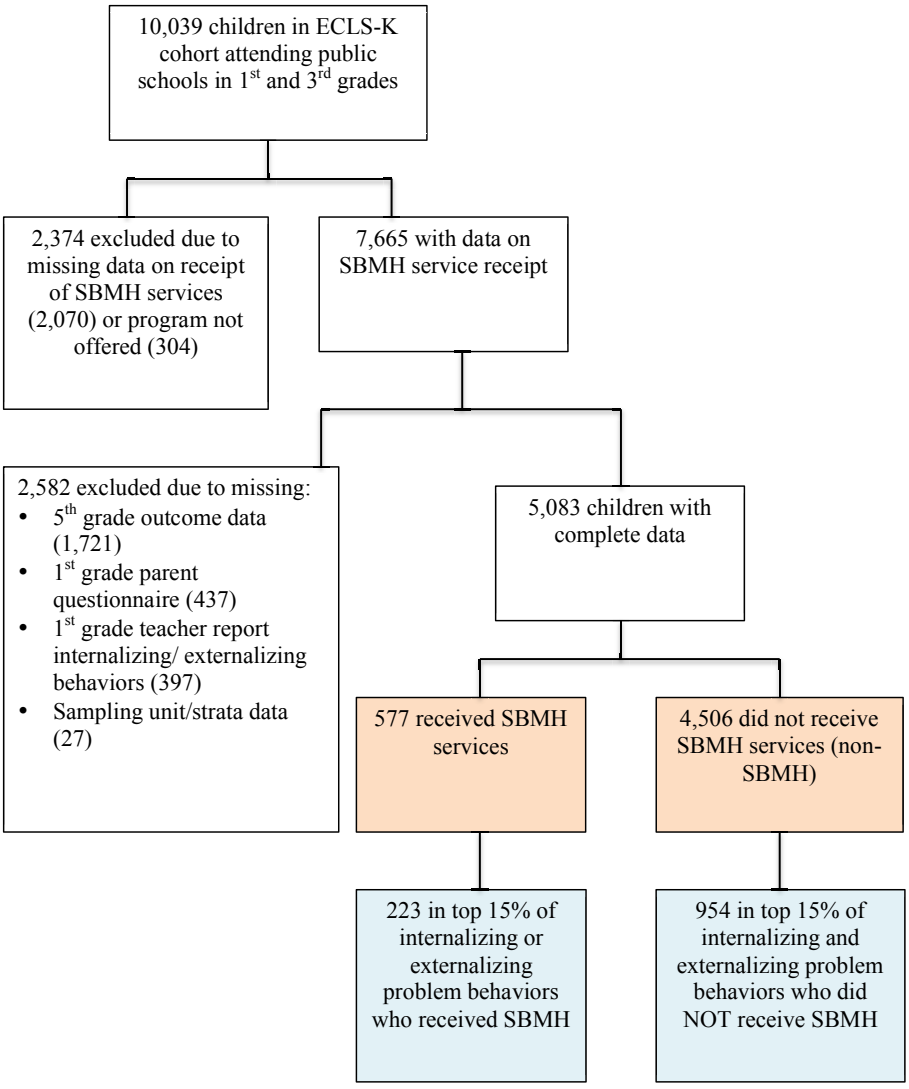

Table 6-1 Covariates Included in Propensity Score Models

Variable Description (first grade, pre-treatment variables)	Response Options as Coded for Study Analysis	Customization from original ECLS-K coding
Child characteristics		
Gender	Male Female	Original ECLS-K coding
Ethnicity	White, non-Hispanic African American, non-Hispanic Latino (race specified or non-specified) Asian/Pacific Islander Native American Multi-racial, non-Hispanic	The ECSL-K composite "race" variable was collapsed into six categories with those selecting multiple races combined into "multi-racial" category
Parent report of disability (e.g., vision, hearing, communication, attention and/or behavior)	Yes/no	Original ECLS-K coding
Number of places lived for 4+ months since last survey	One Two or more	Numerical variable collapsed into binary
Changed schools since last survey	Yes/no	Original ECLS-K coding
Family characteristics		
Socioeconomic status	First quintile Second quintile Third quintile Fourth quintile Fifth quintile	Original coding; ECLS-K composite variable
Parents' highest education level	HS graduate or less Some college or vocational/ technical school Bachelors degree Graduate or professional degree	Nine ELCS-K categories collapsed into four broader categories
Family structure	Two parents plus siblings Two parents no siblings One parent plus siblings One parent no siblings Other	Original ECLS-K coding
Type of parents	Biological parents One biological parent and other parent Single biological mother or father Other	Six ELCS-K categories collapsed into four broader categories
Parents' current marital status	Married Separated, divorced, widow, or never married	Five ECLKS-K categories collapsed into binary variable
Number of siblings	None One Two Three or more	Numerical variable converted to categorical
Health insurance	No insurance Any government insurance Private insurance Other (includes military or combination of any of the above)	ECLS-K binary variables for each insurance option categorized into four options; those with more than one insurance type combined into "other" category
Caregiver involvement		
Caregiver involvement in school	Total score (ranging from 0-6)	Binary responses to six yes/no questions combined into a total scale score
Caregiver involvement at home	Mean score (ranging from 1.2-4)	Average of responses to ten Likert scale questions
Caregiver engagement with child	Mean score (ranging from 1.5-4)	Average of responses to

Variable Description (first grade, pre-treatment variables)	Response Options as Coded for Study Analysis	Customization from original ECLS-K coding
		four Likert scale questions
Socio-emotional indicators (reporter)		
Approaches to learning (parent)	Mean score ranging from 1-4	Original ECLS-K coding
Self-control (parent)	Mean score ranging from 1-4	Original ECLS-K coding
Social interaction (parent)	Mean score ranging from 1-4	Original ECLS-K coding
Impulsive/overactive behaviors (parent)	Mean score ranging from 1-4	Original ECLS-K coding
Internalizing behaviors (parent)	Mean score ranging from 1-4	Original ECLS-K coding
Approaches to learning (teacher)	Mean score ranging from 1-4	Original ECLS-K coding
Interpersonal skills (teacher)	Mean score ranging from 1-4	Original ECLS-K coding
Internalizing behaviors (teacher)	Mean score ranging from 1-4	Original ECLS-K coding
Externalizing behaviors (teacher)	Mean score ranging from 1-4	Original ECLS-K coding
Self control (teacher)	Mean score ranging from 1-4	Original ECLS-K coding
Academic indicators		
Receipt of special education	Yes/no	Original ECLS-K coding
Child reading IRT score	Continuous score (ranging from 29.85-184.05)	Original ECLS-K coding
Child math IRT score	Continuous score (ranging from 20.55-123.49)	Original ECLS-K coding
School characteristics		
Region	Northeast, Midwest, West, South	Original ECLS-K coding
Urbanicity	Urban, Suburban, Rural	Original ECLS-K coding
Enrollment	0 - 149 students 150 – 299 students 300 - 499 students 500 – 749 students 750 students and above	Original ECLS-K coding
Percent of minority students	0% to less than 10% 10% to less than 25% 25% to less than 50% 50% to less than 75% 75% or more	Original ECLS-K coding
Title 1 status	Yes/no	Original ECLS-K coding

Table 6-2 Summary of Balance for Matched Data After Propensity Score Matching

	Treated Means (n=223)	Control Means (n=954)	Mean Difference	Percent Balance Improvement
Child characteristics				
Gender	0.3543	0.3602	-0.0123	88.53
Ethnicity	1.6188	1.5931	0.0231	87.45
Parent report of disability	0.3139	0.3115	0.0052	-8.05
Receipt of special education	0.1121	0.1048	0.0231	34.95
Number of places lived for 4+ months since last survey	0.1839	0.1848	0.0024	96.62
Changed schools since last survey	0.0583	0.0461	0.0520	60.63
Family characteristics				
Socioeconomic status	2.8430	2.7986	0.0327	79.61
Parents' highest education level	0.9327	0.9461	0.0142	88.89
Family structure	1.7623	1.7641	0.0016	94.28
Type of parents	0.8072	0.7806	0.0269	74.68
Parents' current marital status	0.3677	0.3557	0.0249	80.50
Number of siblings	1.3857	1.4470	0.0688	-43.14
Health insurance	1.9646	1.9576	0.0089	86.43
Caregiver involvement				
Caregiver involvement in school	3.8027	3.7166	0.0555	15.52
Caregiver involvement at home	2.7327	2.7436	0.0224	62.38
Caregiver engagement with child	3.5359	3.5305	0.0113	71.63
Socio-emotional indicators (reporter)				
Approaches to learning (parent)	2.9900	2.9787	0.0231	77.20
Self-control (parent)	2.7555	2.7554	0.0003	99.89
Social interaction (parent)	3.2691	3.2920	0.0406	72.41
Impulsive/overactive behaviors (parent)	2.1459	2.0903	0.0730	59.32
Internalizing behaviors (parent)	1.6698	1.6445	0.0578	66.79
Approaches to learning (teacher)	2.4874	2.4666	0.0325	87.69
Interpersonal skills (teacher)	2.5090	2.5057	0.0055	98.08
Internalizing behaviors (teacher)	2.1816	2.2252	0.0739	72.13
Externalizing behaviors (teacher)	2.4110	2.3919	0.0256	87.01
Self control (teacher)	2.5814	2.5881	0.0112	95.79
Academic indicators				
Receipt of special education	0.1121	0.1048	0.0231	83.37
Child reading IRT score	71.4129	72.4839	-0.0505	72.46
Child math IRT score	56.4099	56.7536	-0.0207	91.47
School characteristics				
Region	1.5561	1.5249	0.0340	-8.05
Urbanicity	1.0942	1.1377	-0.0550	34.95
Enrollment	3.3543	3.3347	0.0201	90.62
Percent of minority students	2.3677	2.3152	0.0379	79.21
Title 1 status	0.7274	0.7222	0.0122	-575.64

Figure 6-3 Absolute Standardized Difference in Means Before and After Full Matching

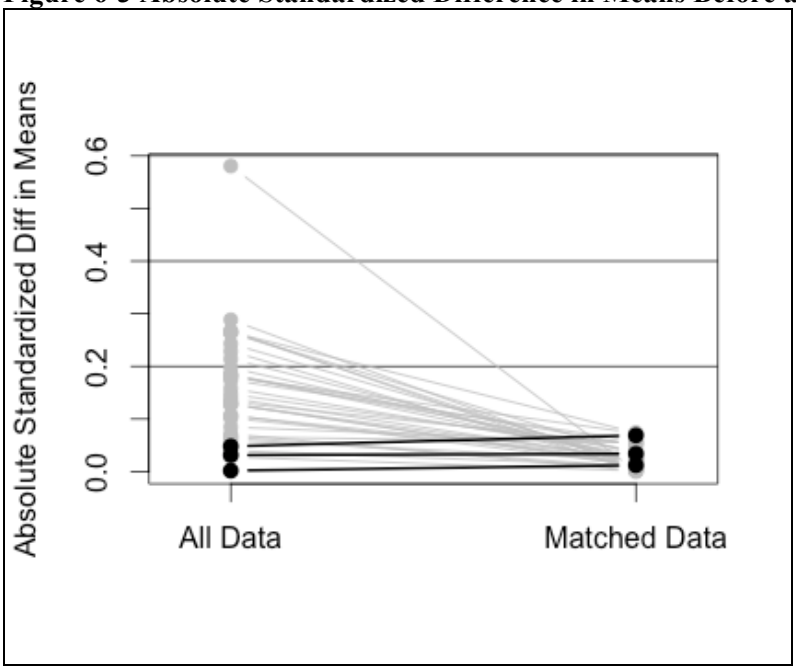

Figure 6-4 Jitter Plot of Propensity Score Distribution After Full Matching

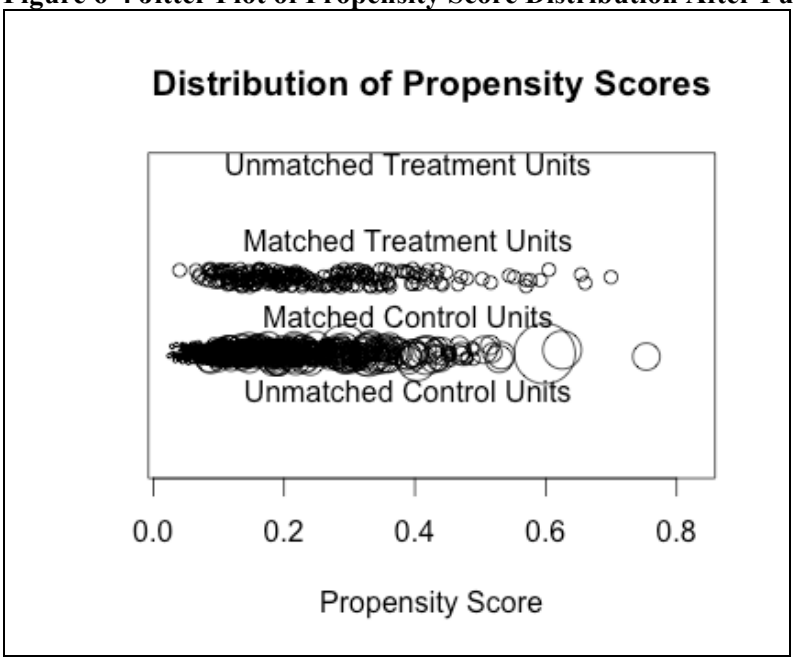

Figure 6-5 Histogram of Propensity Scores After Full Matching

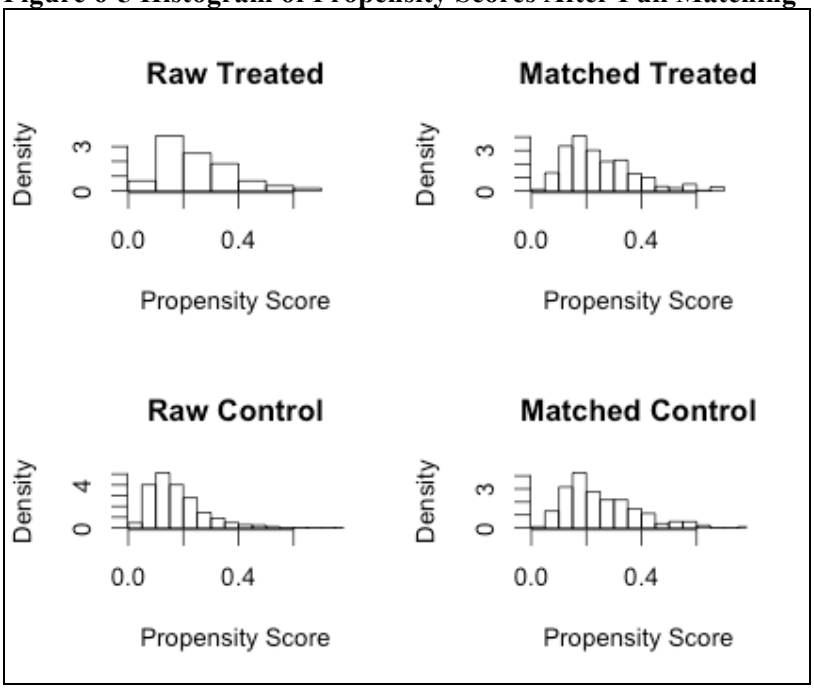

Table 6-3 Un-weighted and Weighted (Unmatched) Sample Characteristics

	Study Sample (No survey adjustments or matching)			Population (Weighted sample, no matching)		
	Received SBMH (n=223)	Did not receive SBMH (n=954)	P value	Received SBMH (n= 85,323)	Did not receive SBMH (n= 278,191)	P value
Child characteristics						
Gender			0.158			0.781
Male	65% (144)	59% (567)		62% (52,944)	60% (167,968)	
Female	35% (79)	41% (387)		38% (32,379)	40% (110,223)	
Ethnicity			0.070			0.038
White	69% (154)	59% (566)		66% (55,954)	66% (167,595)	
African American	12% (27)	16% (150)		17% (20,251)	24% (47,727)	
Latino	12% (27)	15% (145)		17% (6,900)	8% (47,991)	
Asian/Pacific Islander	3% (6)	51% (5)		3% (261)	<1% (7,536)	
Native American	3% (6)	2% (17)		1% (1,289)	2% (3,485)	
Multi-racial	1% (3)	3% (25)		1% (668)	1% (3,858)	
Parent report of disability			0.001			0.001
Yes	32% (70)	21% (198)		40% (33,716)	22% (61,729)	
No	68% (151)	79% (754)		60% (51,415)	78% (216,148)	
Number of places lived for 4+ months since last survey			0.279			0.252
One	81% (177)	84% (794)		71% (60,260)	78% (216,218)	
Two or more	19% (41)	16% (149)		29% (24,356)	22% (59,441)	
Changed schools			0.020			0.477
Yes	6% (13)	3% (26)		13% (10,129)	9% (24,295)	
No	94% (209)	97% (921)		88% (70,906)	91% (247,498)	
Family characteristics						
Socioeconomic status			0.134			0.469
First quintile	18% (41)	16% (151)		18% (15,580)	20% (54,929)	
Second quintile	29% (64)	23% (215)		32% (27,158)	21% (58,522)	
Third quintile	20% (45)	21% (200)		19% (16,199)	23% (63,795)	
Fourth quintile	16% (35)	21% (204)		14% (12,244)	19% (53,305)	
Fifth quintile	17% (38)	19% (184)		17% (14,142)	17% (47,641)	
Parents' highest ed. level			0.240			0.676
HS graduate or less	39% (86)	35% (335)		42% (35,853)	37% (102,152)	
Some college/voc./ tech.	39% (87)	36% (341)		39% (33,318)	38% (105,104)	
Bachelors degree	13% (29)	18% (170)		11% (9,199)	13% (37,400)	
Grad. or professional degree	9% (21)	11% (108)		8% (6,953)	12% (33,534)	
Family structure			0.731			0.237
Two parents plus siblings	64% (143)	64% (613)		61% (52,442)	62% (172,417)	
Two parents no siblings	8% (18)	10% (94)		4% (3,375)	10% (28,638)	
One parent plus siblings	19% (42)	17% (163)		23% (19,335)	20% (54,795)	
One parent no siblings	5% (12)	6% (61)		7% (6,199)	6% (16,649)	
Other	4% (8)	3% (24)		5% (3,971)	2% (5,693)	
Type of parents			0.055			0.128
Biological parents	54% (121)	62% (590)		50% (42,405)	59% (164,357)	
One bio. and other parent	17% (37)	11% (102)		14% (12,123)	12% (34,166)	
Single bio. mother or father	23% (52)	23% (218)		25% (21,073)	25% (69,665)	
Other	6% (13)	5% (44)		11% (9,721)	4% (10,004)	
Current marital status			0.078			0.035
Married	63% (141)	69% (660)		55% (47,100)	69% (192,247)	
Separated, divorced, widow, or never married	37% (82)	31% (292)		45% (38,223)	31% (85,752)	
Number of siblings			0.620			0.295
None	15% (33)	17% (166)		12% (10,438)	17% (48,146)	
One	45% (100)	45% (428)		43% (36,309)	44% (123,517)	
Two	27% (61)	24% (227)		25% (20,973)	25% (69,632)	
Three or more	13% (29)	14% (133)		21% (17,603)	13% (36,896)	

	Study Sample (No survey adjustments or matching)			Population (Weighted sample, no matching)		
	Received SBMH (n=223)	**Did not receive SBMH (n=954)**	**P value**	**Received SBMH (n= 85,323)**	**Did not receive SBMH (n= 278,191)**	**P value**
Health insurance			0.130			0.566
No insurance	6% (13)	4% (35)		6% (4,712)	3% (8,233)	
Any govt. insurance	16% (34)	13% (119)		17% (13,046)	15% (40,576)	
Private insurance	53% (113)	61% (563)		50% (39,534)	58% (158,564)	
Other	25% (52)	22% (204)		27% (21,500)	24% (63,962)	
Caregiver involvement/engagement						
School involvement	3.80 (SE=0.10)	3.90 (SE=0.05)	0.339	3.76 (SE=0.20)	3.99 (SE=0.92)	0.313
Home involvement	2.73 (SE=0.03)	2.70 (SE=0.01)	0.403	2.83 (SE=0.06)	2.73 (SE=0.26)	0.095
Caregiver engagement	3.53 (SE=0.03)	3.52 (SE=0.02)	0.740	3.55 (SE=0.04)	3.50 (SE=0.03)	0.829
Socio-emotional indicators						
Parent report						
Approaches to learning	2.99 (SE=0.03)	3.04 (SE=0.02)	0.118	3.01 (SE=0.06)	3.06 (SE=0.03)	0.260
Self-control	2.75 (SE=0.04)	2.91 (SE=0.02)	0.001	2.70 (SE=0.09)	2.86 (SE=0.03)	0.071
Social interaction	3.27 (SE=0.04)	3.35 (SE=0.2)	0.033	3.16 (SE=0.08)	3.34 (SE=0.03)	0.054
Impulsive/overactive	2.15 (SE=0.05)	2.01 (SE=0.2)	0.004	2.24 (SE=0.08)	2.08 (SE=0.04)	0.095
Internalizing behaviors	1.67 (SE=0.03)	1.59 (SE=0.01)	0.019	1.73 (SE=0.08)	1.65 (SE=0.03)	0.271
Teacher report						
Approaches to learning	2.49 (SE=0.04)	2.66 (SE=0.02)	0.003	2.44 (SE=0.08)	2.63 (SE=0.03)	0.015
Interpersonal skills	2.51 (SE=0.04)	2.68 (SE=0.02)	0.001	2.51 (SE=0.08)	2.67 (SE=0.03)	0.070
Internalizing behaviors	2.18 (SE=0.04)	2.03 (SE=0.02)	0.001	2.14 (SE=0.08)	2.03 (SE=0.03)	0.116
Externalizing behaviors	2.41 (SE=0.05)	2.26 (SE=0.02)	0.005	2.32 (SE=0.07)	2.31 (SE=0.04)	0.768
Self control	2.58 (SE=0.04)	2.74 (SE=0.02)	0.001	2.64 (SE=0.07)	2.71 (SE=0.03)	0.386
Academic indicators						
Receipt of special education			0.026			0.040
Yes	7% (65)	11% (25)		15% (12,598)	8% (21,494)	
No	93% (889)	89% (198)		85% (72,725)	92% (256,697)	
Child reading IRT score	71.3 (SE=1.5)	75.3 (SE=0.7)	0.014	74.4 (SE=3.9)	74.5 (SE=1.2)	0.074
Child math IRT score	56.4 (SE=1.1)	60.4 (SE=0.5)	0.001	56.8 (SE=1.9)	59.9 (SE=0.7)	0.842
School characteristics						
Region			0.360			0.727
Northeast	14% (32)	17% (159)		10% (8,897)	16% (43,693)	
Midwest	31% (69)	27% (260)		24% (20,686)	22% (61,907)	
West	39% (88)	37% (353)		44% (37,799)	41% (115,174)	
South	15% (34)	19% (182)		21% (17,942)	21% (57,418)	
Urbanicity			0.191			0.884
Urban	27% (60)	28% (267)		29% (24,564)	28% (77,455)	
Suburban	36% (79)	41% (392)		44% (36,395)	47% (130,913)	
Rural	37% (81)	31% (293)		27% (22,667)	25% (69,598)	
Enrollment			0.045			0.024
0 - 149 students	2% (5)	2% (19)		1% (790)	3% (9,353)	
150 – 299 students	15% (32)	13% (121)		9% (7,305)	13% (35,125)	
300 - 499 students	43% (94)	34% (323)		50% (41,589)	33% (91,789)	
500 – 749 students	25% (55)	29% (278)		29% (24,306)	30% (83,183)	
750 students and above	15% (33)	22% (209)		11% (9,443)	21% (58,079)	
Percent of minority students			0.070			0.369
0% to less than 10%	37% (80)	35% (327)		27% (22,147)	28% (77,315)	
10% to less than 25%	22% (49)	19% (178)		21% (17,294)	21% (56,895)	
25% to less than 50%	19% (42)	15% (146)		20% (16,507)	18% (50,272)	
50% to less than 75%	9% (20)	11% (104)		21% (17,329)	13% (36,744)	
75% or more	13% (28)	20% (191)		12% (10,156)	20% (55,397)	
Title 1 status			0.978			0.758
Yes	73% (152)	73% (629)		72% (57,387)	75% (185,298)	
No	27% (57)	27% (237)		28% (21,783)	25% (63,093)	

Table 6-4 Results of Estimated Differences in 5th Grade Mental Health and Academic Indicators among Children with Mental Health Needs Who Received SBMH Services Compared to Children with Mental Health Needs Who Did Not Receive Services

	Study Sample Estimates (No survey adjustments or matching)			Matched Sample Estimates (No survey adjustments)			Population Estimates (Accounting for matching and survey weights)		
Outcome	**ATT**	**SE**	**P value**	**SATT**	**SE**	**P value**	**PATT**	**SE**	**P value**
Teacher reported internalizing behavior change score	-0.078	0.06	0.163	-0.097	0.08	0.198	0.066	0.13	0.605
Teacher reported externalizing behavior change score	-0.211	0.05	<0.001	-0.240	0.06	<0.001	-0.206	0.10	0.034
Child reported internalizing behavior change score	0.039	0.06	0.486	0.045	0.06	0.471	-0.011	0.159	0.943
Child reported externalizing behavior change score	-0.048	0.05	0.382	-0.074	0.05	0.163	-0.167	0.14	0.235
Reading IRT gain scores	0.132	1.17	0.911	-1.028	1.52	0.500	-5.716	2.59	0.028
Math IRT gain scores	-0.973	0.99	0.328	-1.513	1.19	0.206	-3.757	1.48	0.012
Total 5th grade absences	0.003	0.12	0.982	-0.051	0.12	0.673	-0.173	0.15	0.261
Total 5th grade days tardy	0.119	0.14	0.383	-0.043	0.17	0.799	-0.311	0.24	0.198
Note: ATT = average treatment effect on the treated; SATT = sample average treatment effect on the treated; PATT = population average treatment effect on the treated									

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Chapter 7: Conclusion

Summary of Findings

The three aims of this dissertation produced three studies of school-based mental health (SBMH) services using a nationally representative sample of children in public schools, a subset of the ECLS-K. The purpose of the first study was to identify the school level characteristics associated with receipt of SBMH services among third grade students with mental health needs. It was hypothesized that children with mental health needs who attended schools with lower resources or that served high needs populations would be less likely to receive SBMH services. This hypothesis was based on previous research demonstrating that schools in low resource or high poverty areas are often less likely to have the means to provide support services (Han, 2008). However, these characteristics were not associated with receipt of SBMH services in this study, indicating that these school characteristics fortunately did not hinder students' receipt of care. The most significant finding from this study was that greater availability of counseling staff in a school was associated with higher likelihood that children would receive SBMH services. Specifically, the odds of receiving services nearly doubled for children attending schools with more than one full-time equivalent (FTE) counseling staff compared to those attending schools with only one half-time equivalent, suggesting that modest increases of counseling staff could help to reach more students with mental health needs. A geographic disparity was also found in the distribution of service receipt, with schools in the southern U.S. being significantly more likely than other regions to have an unfavorable ratio of counseling staff to students compared to the national average (>500 students per 1 FTE staff). With more children living in poverty in the southern U.S. than other areas, a factor linked to poorer educational and health outcomes (Coley & Baker, 2013), study findings suggest that an investment of resources to expand SBMH services in this region may be warranted.

The second aim of this dissertation was to identify the individual and family level characteristics associated with SBMH service receipt among third grade students with mental health needs. The most significant predictors of children's SBMH service receipt were the reported type and level of problem behavior. Children identified by teachers as having either externalizing or internalizing problem behaviors, as well as those who had self-identified externalizing behaviors, had significantly higher odds of receiving SBMH services, which was consistent with previous studies (Zahner & Daskalakis, 1997). Moreover, even among children identified as having a need for mental health services, a linear relationship was observed such that as the number of mental health sub-scale scores in the top (worst) 15th percentile increased, children's odds of receiving services increased, compared to children with only two scores in the top 15%. While it is encouraging that those with the highest levels of need were most likely to receive services, children with self-identified mental health needs that were not also identified by teachers had significantly lower odds of receiving services than those whose needs were identified by teachers. Thus, increased efforts to promote teacher recognition of symptoms could benefit these children.

The third aim of the study was to examine whether children with mental health needs who received SBMH services in third grade had improved socio-emotional and academic outcomes at fifth grade follow-up, compared to a matched sample of peers with reported mental health needs who did not receive SBMH services. It was hypothesized that children with high mental health needs pre-treatment (first grade) who received SBMH services in third grade would have improved socio-emotional indicators at fifth grade follow-up, though differences were not expected in academic indicators. However, no significant improvements were observed in socio-emotional or academic indicators for those who received SBMH services. Unexpectedly, teacher reported externalizing behaviors improved less for children who received treatment compared to those who did not. Although these findings contradict what was anticipated, it is likely that this is largely due to the limitations in the dataset that was used. Without measures of dosage, frequency,

timing or quality of service receipt, it is not possible to characterize the SBMH services as ineffective.

Limitations and Strengths

There are several limitations to this study, many of which are associated with the limitations of the dataset. Yet, it should be noted that the ECLS-K is the only nationally representative longitudinal study of children's socio-emotional and academic functioning that also includes detailed data on schools and any information on receipt of mental health care in schools.

First, the identification of children receiving SBMH services was limited to those children whose teachers indicated that they were receiving mental health services during the school day. This is problematic since teachers may not always be aware if children are receiving these services at school. However, in third grade, children usually spend the whole school day with the same teacher, so teachers are more likely to know which services they receive. Importantly, children with mental health needs might have been receiving treatment outside of school. Although a small proportion of children with mental health needs actually receive such treatment (Kataoka et al., 2002; Merikangas, He, Brody, et al., 2010), their treatment would not be captured in these studies.

Second, this study used screening tools completed by teachers and children to identify children with mental health needs, rather than diagnostic instruments or professional assessments. The ECLS-K scales had good reliability, but the extent to which they identified children who had a diagnosable mental disorder is not known. Moreover, it is unclear whether the children identified based on having two problem scores in the worst 15 percentile were actually in need of treatment. Reporter bias is also a concern when defining the sample of children with mental health needs. Most teachers are not trained to identify children with mental health needs and not all children are comfortable with sharing or able to recognize their own needs. Moreover, teachers

are often more likely to identify externalizing behaviors that disrupt the classroom than internalizing behaviors, which manifest as undisruptive behaviors, such as withdrawal or shyness. Variation between reporters on how they assessed problem behaviors is likely, e.g., some teachers may have rated children less severely on problem behaviors than others. These biases may have led to some children being excluded from the sample of children with potential mental health concerns or others being included who did not have mental health needs.

A third limitation relates to the definition of need and the comparability of those who received services with those who did not in the third study. In order to have a pre-treatment measure of need for mental health services, this study needed to identify the sample based on their first grade problem levels. Only a small proportion of children with significant problems in first grade received SBMH services in 3rd grade. It is likely that these children had very significant problems. Despite the effort to equate them with children with first grade need who did not receive services in third grade through propensity score matching, it appears that their significant emotional and behavioral symptoms persisted into fifth grade, with the result that, like many studies of service use, those treated were no better or worse two years later than the comparison group.

Finally, this study does not assess the quality, frequency or duration of SBMH services, all of which should significantly affect the potential impacts of services on children's outcomes. Study findings are based on samples defined only by a 'yes/no' identification by teachers that the child is receiving services during the school day.

Despite these limitations, there are also several strengths to this study. First, the ECLS-K is a population-based longitudinal study that provides data from multiple sources on children's health and academic indicators, as well as a rich set of covariates, which allowed for a more robust analysis of associations with the outcomes. In particular, this data source provided the ability to link data on mental health and educational indicators and outcomes for children on a population level, which is lacking in the literature.

Second, school level and family level data available in the ECLS-K supported analysis of a comprehensive set of factors that relate to the likelihood that children receive SBMH services, significantly improving understanding of what matters most in terms of access to mental health services in public elementary schools.

Third, the ECLS-K's longitudinal design allowed for identification of a matched sample of students who did and did not receive SBMH services in third grade based on pre-treatment variables in first grade. It also allowed for the examination of outcomes post-treatment in the fifth grade. Although children's outcomes in the third study were not improved, the results highlight the challenges faced by schools in providing mental health services and educating the small group of children with persistent mental health problems. Studies that span over several years are also lacking in the SBMH literature.

Finally, the ECLS-K's complex survey design and the use of weighting allowed for generalization of study outcomes to the target population of children attending public elementary schools in the United States.

Policy, Practice and Research Implications

Findings from this study have implications for program and policy development, as well as for future research.

Policy and Practice Implications

Examination of the school level characteristics associated with receipt of services helped to identify facilitators of SBMH service receipt among children with mental heath needs, specifically identifying that a modestly higher level of counseling staff is associated with greater odds of children receiving services. In recent years, the Federal government has invested significant resources in improving mental health services for youth in the U.S. One such investment is the "Now is the Time Project AWARE (Advancing Wellness and Resilience Education)" initiative. This initiative provided nearly $75 million in funding in 2014 to state and

local education agencies to raise mental health awareness among children and school staff and to connect children experiencing mental health issues with appropriate services, including school-based services (U.S. Government, 2014). The present study's findings support the value of such program and policy initiatives to invest in expansion of staffing for SBMH services to serve more children in need.

The study also identified geographic disparities in service receipt that was linked directly to unfavorable student to counseling staff ratios in the southern United States. These findings can help Federal agencies and state departments of education make more informed decisions about prioritizing scarce resources to support all schools with a minimum student to counselor ratio.

Furthermore, the study also found that children with the highest level of mental health concerns, and particularly those with teacher identified externalizing behaviors, were more likely to receive services. While it is important that these children receive support services, there are also a large portion of children with lower levels of need that are self-identified but not recognized by teachers who could benefit from evaluation and support. In future development of school-based interventions, it would be important to increase teachers' awareness and recognition of mental health concerns so that children with more moderate levels of need can also be identified and referred to services.

Research Implications

This dissertation contributes to the scant literature regarding which children receive SBMH services in U.S. public elementary schools and the factors associated with service receipt. While several predictors were identified, such as adequate availability of counseling staff and higher levels of mental health need, additional research is needed to further elucidate these relationships. As many factors that were studied were not associated with service receipt, further research is also needed that includes all sources of mental health care in order to better determine what characteristics are associated with children receiving SBMH services. Further studies should

also examine the specific types and organization of SBMH services that reach the students most in need, which could better inform program planning and policy development.

Previous research demonstrates that SBMH services can improve mental health outcomes (Hoagwood et al., 2007; Hussey & Guo, 2003). Furthermore, research from the health and education fields shows that poor mental health negatively impacts academic success and that, by improving student health, school health programs have a positive influence on academic performance (Basch, 2010). This study attempted to demonstrate these impacts in a national sample of elementary school children, and although prior research supports the hypotheses this dissertation examined, positive effects were not found. Despite all the strengths of the ECLS-K dataset, it was not the optimal dataset for this inquiry, particularly given the lack of information on quality and quantity of services received. Yet, it was the only dataset available with the potential to study this phenomenon on a population level. Given investments in SBMH services, particularly on the national level, there is a clear gap in our research base to study these investments. As a result, researchers do not have the ability to discern how well services are responding to children's mental health needs. Efforts to collect population level data, with the methodological design and rigor of studies like the ECLS-K, that ask more specific questions related to mental health need, service delivery and receipt, and mental health and academic outcomes are critically needed.

Importantly, there is no standardization across SBMH services in the U.S. in terms of the staffing requirements, the quality or even the minimum quantity of services delivered, which makes studying impacts challenging. Recently, through support from the Federal Maternal and Child Health Bureau, the Center for School Mental Health in the University of Maryland School of Medicine launched a multi-year initiative to conduct a census of SBMH programs and to develop a set performance measures that can document the quality of clinical and preventive services being delivered by SBMH programs nationwide (University of Maryland School of Medicine Center for School Mental Health, 2014). This is an important step in developing a

national data system to better monitor SBMH programs and will hopefully lead to more available data to effectively evaluate the reach and impacts of these programs.

Conclusions

This dissertation demonstrated that a large portion of children in U.S. public elementary schools with mental health needs receive school-based services to address these needs. However, additional research is needed to better demonstrate the impacts of these services on a population level on children's health and development. It has been well documented in the literature that many children who receive mental health services enter the mental health service system by first receiving services from the education sector. For many of these children, schools are the sole provider of services. Thus, we need to focus more resources on ensuring that children have equitable access to this care and that it is of high quality, particularly in early and middle childhood, when mental health powerfully affects children's development and lifelong outcomes, as well as their future interactions with the mental health care system.

The landscape of how services are delivered in schools to support children with mental health treatment needs continues to evolve. The increase in charter schools that are more loosely governed than traditional public schools, adds to the complexity of understanding how effectively support services are delivered to children in school settings. Education budgets continue to fluctuate and schools are increasingly expected to support children with fewer resources. Yet, we know that children must be healthy in order to learn. Monitoring the structure of SBMH programs nationwide is of utmost importance to determine whether students in need are receiving services and how these services are best structured to achieve the most impact. The literature on these services is still emerging and this dissertation provides a structure for future population-based studies to continue these inquiries.

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Chapter 8: Appendices

Appendix 1: Summary of Results from Exploratory Analysis to Identify Sample of Children with Mental Health Needs in Third Grade

Within the ECLS-K third grade cohort, 7,824 children were in the third grade, attended public schools, had data on whether they received school-based mental health services, and had recorded scores on all six teacher and self reported mental health sub-scales (internalizing behaviors, externalizing behaviors, and peer relations) described in the Methods section of this dissertation. Exploratory analyses were conducted to determine how to best identify children with mental health needs in this population.

Population-based estimates in the literature show that approximately 15% of children between the ages of 8-11 have mental health disorders, yet a portion of children also have needs that are sub-clinical or undiagnosed. Based on these population estimates, it was estimated that approximately 20-25% of children in the ECLS-K cohort should be identified as having mental health needs. This percentage was used as a guide to determine whether criteria used to identify the sample of children with mental health needs was accurate. After a potential sample that matched these estimates was identified, further exploratory analyses were conducted to ensure that the characteristics of the sample reflected those documented in the literature on children with mental health needs in this age group, i.e., comprising slightly more males and more teacher reported externalizing behaviors.

The tables below provide a summary of the cutoff points that were considered using children's teacher and self-reported sub-scale scores to identify those with mental health needs. Results of these exploratory analyses revealed that children with at least two sub-scale scores in the top 15% were the most representative sample of children with mental health needs.

Table 1. Children with Sub-Scale Scores in the Top 15%

	No mental health need (i.e., no sub-scale scores in top 15%)	**Potential Mental Health Need**					
# sub-scale scores in top 15%	0	1	2	3	4	5	6
# children	4,159	1,842	1,003	492	241	69	18
% of sample	53%	24%	**13%**	**6%**	**3%**	**1%**	**<1%**

For these results, if anyone with at least one sub-scale score in the top 15% was considered to have a mental health need, that would represent 47% of the sample, which is much higher than U.S. population estimates.

Those with at least two sub-scale scores in the top 15% represent 23% of the sample, which is much closer to population estimates. Further exploratory analysis revealed that these children were mostly male (60%) and were more likely to have teacher reported externalizing behaviors in the top 15% of scores than self-reported (54% teacher vs. 47% child report) and more self-reported internalizing behaviors than teacher reported (47% report vs. 40% teacher report).

Table 2. Children with Sub-Scale Scores in the Top 20%

	No mental health need (i.e., no sub-scale scores in top 20%)	Potential Mental Health Need					
# sub-scale scores in top 20%	0	1	2	3	4	5	6
# children	3,397	1,936	1,249	707	368	133	34
% of sample	43%	25%	16%	9%	5%	2%	<1%
For these results, if anyone with at least one sub-scale score in the top 20% was considered to have a mental health need, that would represent 57% of the sample, which is much higher than U.S. population estimates. One-third (32%) of children had two or more scores in the top 20%, which is also higher than national estimates and if a cutoff of three scores in the top 20% was used, this would leave 16% of the population, which is too small compared to national estimates.							

Table 3. Children with Sub-Scale Scores in the Top 10%

	No mental health need (i.e., no sub-scale scores in top 10%)	Potential Mental Health Need					
# sub-scale scores in top 10%	0	1	2	3	4	5	6
# children	4,733	1,701	819	364	160	40	7
% of sample	60%	22%	10%	5%	2%	<1%	<1%
For these results, if anyone with at least one sub-scale score in the top 10% was considered to have a mental health need, that would represent 40% of the sample, which is much higher than U.S. population estimates. Children with at least two sub-scale scores in the top 10% represented 18% of the sample, which is smaller than national estimates.							

Table 4. Children with Sub-Scale Scores in the Top 5%

	No mental health need (i.e., no sub-scale scores in top 5%)	Potential Mental Health Need					
# sub-scale scores in top 5%	0	1	2	3	4	5	6
# children	6,222	1,075	358	136	24	9	0
% of sample	80%	14%	5%	2%	<1%	<1%	0%
For these results, if anyone with at least one sub-scale score in the top 5% was considered to have a mental health need, that would represent 20% of the sample, which is in line with U.S. population estimates. This would have been another viable sample definition, however given the small number of children with acute needs, this sample definition was not selected.							

Appendix 2: Key Independent and Dependent Variables Used in this Dissertation

Variable Description	Operationalization	Data Source	Grades Used
Receipt of School-Based Mental Health Services Primary Dependent Variable Aims 1 and 2; Primary Independent Variable Aim 3			
Receipt of school-based mental health services: *Does this child receive instruction and/or related services in any of the following types of programs in your school during the school day?... Individual or group counseling from a trained professional*	Dichotomous (0=No; 1=Yes) *Note: excluded "program not offered"*	Teacher Questionnaire – Spring Part C	3rd
Mental Health Need & Socio-Emotional/Academic Outcomes Independent Variables Aims 1 and 2; Primary Dependent Variables Aim 3			
Peer relations scale score (combination of self-control and interpersonal in 3rd and 5th grades; separate scales in 1st grade)	Continuous (mean scale score)	Teacher Social Rating Scale (SRS)	1st, 3rd and 5th
Externalizing problem behavior scale score	Continuous (mean scale score)	Teacher SRS	1st, 3rd and 5th
Internalizing problem behavior scale score	Continuous (mean scale score)	Teacher SRS	1st, 3rd and 5th
Approaches to learning	Continuous (mean scale score)	Teacher SRS	1st
Peer relations scale score	Continuous (mean scale score)	Child Self-Description Questionnaire (SDQ)	3rd
Externalizing problems scale score	Continuous (mean scale score)	Child SDQ	3rd and 5th
Internalizing problems scale score	Continuous (mean scale score)	Child SDQ	3rd and 5th
Internalizing, approaches to learning, impulsive, self-control and interpersonal scale scores	Continuous (mean scale score)	Parent SRS	1st grade
Overall reading IRT scale score	Continuous	Child Assessment	1st, 3rd and 5th
Overall math IRT scale score	Continuous	Child Assessment	1st, 3rd and 5th
Total school absences	Continuous	School records abstract	5th
Total school days tardy	Continuous	School records abstract	5th
Independent Variables: Student Characteristics			
Gender	Dichotomous (0=Male, 1=Female)	Parent Interview	All grades
Race	Categorical: 1=White, 2=Black or African American, 3=Hispanic, any race, 4=Asian, Native Hawaiian or other Pacific Islander, 5=American Indian or Alaska Native, 6=More than 1 race, non-Hispanic	Parent Interview	All grades
Special education status (receives special education or related services during school day)	Dichotomous (yes/no)	Teacher Questionnaire – Spring Part C	1st and 3rd
Parent reported child disability (i.e., vision, hearing, communication, attention, behavior)	Dichotomous (yes/no)	Parent Interview	1st and 3rd
Parent-reported child emotional concerns (*Do you have any concerns about [child]'s overall emotional behavior, such as anxiety or*	Dichotomous (yes/no)	Parent Interview	3rd

Variable Description	Operationalization	Data Source	Grades Used
depression?)			
Residential mobility (number of places child lived for 4+ months since last survey)	Dichotomous: 0=one; 1=two or more	Parent Interview	1st and 3rd
Changed schools since last survey	Dichotomous (yes/no)	Parent Interview	1st and 3rd
Family Characteristics			
Household socioeconomic status (SES)	Categorical: Quintiles (1=low; 5=high)	Parent Interview	1st and 3rd
Parent type	Categorical: 1=biological mother and biological father; 2=biological mother and other parent; 3=biological mother or father only; 4=other	Parent Interview	1st and 3rd
Parent's education level	Categorical: 0 =HS graduate or less 1=Some college or vocational/tech 2=Bachelors degree 3=Graduate or professional degree	Parent Interview	1st
Family structure	Categorical: 1=two parents and sibling(s); 2=two parents, no siblings; 3=one parent and sibling(s); 4=one parent, no siblings; 5=other	Parent Interview	1st and 3rd
Number of siblings	Categorical: 0=none; 1=one; 2=two; 3=3 or more	Parent Interview	1st and 3rd
Current marital status	Dichotomous: 0=married; 1=separated, divorced, widowed or never married	Parent Interview	1st
Caregiver depressive symptoms	Continuous (score of 0-36; higher score shows higher level of symptoms)	Parent Interview	3rd
Caregiver involvement at school	Total score of yes/no to six questions (range from 0-6)	Parent Interview	1st
Caregiver involvement at home	Mean score of Likert scale responses to ten questions (range from 1 to 4)	Parent Interview	1st
Caregiver engagement with child	Mean score of Likert scale responses to four questions (range from 1 to 4)	Parent Interview	1st
School Characteristics			
Region	Caterogical: Northeast, South, West, Midwest	School Administrator Questionnaire	1st and 3rd
Urbanicity	Categorical: 1=large and mid-size city; 2=large and mid-size suburb, large town; 3=small town, rural	School Administrator Questionnaire	1st and 3rd
Title 1 status	Dichotomous (0=No; 1=Yes)	School Administrator Questionnaire	1st and 3rd
School enrollment	Categorical: 1=0–149 students 2=150–299 students 3=300–499 students 4=500–749 students 5= 750-999 students 6=1,000+ students	School Administrator Questionnaire	1st and 3rd
Percent minority students in school	Categorical: 1=0% - <10%; 2=10% - <25%; 3=25% to <50%; 4=50% to <75%; 5=75% or more	School Administrator Questionnaire	1st and 3rd
Percent students eligible for free lunch in school	Categorical: 1=0% - <10%; 2=10% - <25%; 3=25% to <50%; 4=50% or more	School Administrator Questionnaire	3rd
Full-time equivalent social workers or psychologists ("counseling staff")	Categorical: 0=0.5 FTE; 1=1 FTE; 2=≥1 FTE; 3=none	School Administrator Questionnaire	3rd

Variable Description	Operationalization	Data Source	Grades Used
Classroom Characteristics			
Percent minority in classroom	Categorical: 1=0% - <10%; 2=10% - <25%; 3=25% to <50%; 4=50% to <75%; 5=75% or more	Teacher Questionnaire – Part A	3rd
Teacher rating of classroom behavior	1=Group misbehaves very frequently and is almost always difficult to handle 2=Group misbehaves frequently and is often difficult to handle 3=Group misbehaves occasionally 4=Group behaves well 5=Group behaves exceptionally well	Teacher Questionnaire – Part A	3rd
Ratio of boys to girls • Number of boys in class • Number of girls in class	Categorical: 0=equal boys and girls; 1=more boys; 2=more girls	Teacher Questionnaire – Spring Part A	3rd
Class size	Categorical: 0= <18 students; 1=18-22 students 2= >22 students	Teacher Questionnaire – Spring Part A	3rd
Teacher Characteristics			
Number of years teaching	Categorical: 0=less than 5 years; 1=6-10 years; 2=11-20 years; 3=over 20 years	Teacher Questionnaire – Part B	3rd
Highest level of education completed	1-High school diploma or GED; Associate's degree 2= Bachelor's degree; at least one year of course work beyond a Bachelor's degree but not a graduate degree 3=Master's degree; education specialist or professional diploma based on at least one year of course work past a Master's degree level 4=Doctorate	Teacher Questionnaire – Part B	3rd
Job satisfaction	Mean score based on Likert scale responses to three questions (range 1-5)	Teacher Questionnaire – Part B	3rd

Chapter 9: Thesis References

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Chapter 10: Curriculum Vitae

SAMIRA SOLEIMANPOUR, MPH

EDUCATION

Johns Hopkins University, Bloomberg School of Public Health, Department of Population, Family and Reproductive Health — **Baltimore, MD**
Doctor of Philosophy — Expected
Dissertation: *The Connection between Elementary School Students' Mental Health Problems, Receipt of School-Based Mental Health Services, and Socio-Emotional and Academic Outcomes* — December 2015

George Washington University, School of Public Health and Health Services — **Washington, DC**
Master of Public Health, Maternal and Child Health Concentration — June 1999

George Washington University, Columbian College of Arts and Sciences — **Washington, DC**
Bachelor of Arts, Psychology with Honors — May 1996

PROFESSIONAL EXPERIENCE

University of California, San Francisco, Philip R. Lee Institute for Health Policy Studies — **San Francisco, CA**
Senior Researcher — July 2010 – present
Project Director — September 2000 – June 2010
Design and direct child and adolescent health research and evaluations projects, with an emphasis on school-based health and wellness initiatives; write grants to secure funding from government and private funding sources; develop qualitative and quantitative data collection instruments; oversee program budgets, data collection activities and human subjects research protocols; supervise research and administrative staff; conduct data analyses; and disseminate research and evaluation findings through reports, presentations and peer-reviewed publications.

Santa Rosa Memorial Hospital, Community Benefit Department — **Santa Rosa, CA**
July 1999 – September 2000
Program Specialist
Designed and implemented a health promotion program for adolescent females; recruited, trained and supervised program staff and volunteers; wrote grants and managed program budget; conducted program evaluation; and served on community Adolescent Population Study Group.

George Washington University — **Washington, DC**
Development Prospect Researcher, ***Alumni/Development Services*** — October 1996 – July 1999
Executive Aide, ***Medical Center Alumni & Development Office*** — Sept. 1992 – October 1996
Compiled information on individual donors, corporations and foundations; trained staff on research protocols and prospect management database; managed office budget and scheduling; and assisted with publication development.

TEACHING EXPERIENCE

Johns Hopkins University, Bloomberg School of Public Health, Department of Population, Family and Reproductive Health
Course: Preventing Infant Mortality and Promoting the Health of Women, Infants and Children
Guest Lecturer (Topic: maternal depression) April 2014
Teaching Assistant April – May 2013

HONORS AND AWARDS

Cheryl Alexander Memorial Fund, Johns Hopkins University, Bloomberg School of Public Health August 2014
Willian Endowment for Excellence in Science for Population, Family and Reproductive Health, Johns Hopkins University, Bloomberg School of Public Health August 2014
Children's Mental Health Services & Service System Fellowship, National Institute of Mental Health, National Institutes of Health August 2011 – July 2013
Great People Award, University of California, San Francisco, School of Medicine September 2004

PROFESSIONAL CERTIFICATIONS

Johns Hopkins University, Bloomberg School of Public Health
Certificate in Mental Health Services Research June 2013
Certificate in Maternal and Child Health June 2012
Certificate in Population and Health June 2012

PROFESSIONAL ACTIVITIES

Section Councilor, School Health and Education Section, American Public Health Association 2013 - present
Evaluation & Quality Committee Member, School-Based Health Alliance 2013 - present
Organizational Member, California School Based Health Alliance 2009 - present
Peer Reviewer, Journal of Adolescent Health 2015
Peer Reviewer, Pediatrics 2014
Peer Reviewer, Perspectives on Sexual and Reproductive Health 2013
Peer Reviewer, American Journal of Public Health 2011
Peer Reviewer, Children and Youth Services Review 2010
Peer Reviewer, Preventing Chronic Disease: Public Health Research, Practice and Policy 2010
Peer Reviewer, Progress in Community Health Partnerships: Research, Education, and Action 2008

PEER REVIEWED ARTICLES

1. Lewis C, Deardorff J, Lahiff M, **Soleimanpour S,** Sakashita K, Brindis C. (2015). High school students' experiences of bullying and victimization and the association with school health center use. *Journal of School Health (in press).*
2. Keeton V, **Soleimanpour S**, Brindis C. (2012). School-based health centers in an era of health care reform: Building on history. *Current Problems in Pediatric and Adolescent Health Care,* 42(6), 132-156.
3. Amaral G, Geierstanger S, **Soleimanpour S**, Brindis C. (2011). Mental health characteristics and health-seeking behaviors of adolescent school-based health center users and non-users. *Journal of School Health*, 81(3), 138-145.
4. **Soleimanpour S**, Geierstanger S, Kaller S, McCarter V, Brindis C. (2010). The role of school health centers in health care access and client outcomes. *American Journal of Public Health*, 100(9), 1597-1603. Also published in School-Based Health Care: Advancing Educational Success and Public Health, Eds. J.W. Richardson & T.D. Wright. Washington, DC: APHA Press, 2011.
5. **Soleimanpour S**, Brindis C, Geierstanger S, Kandawalla S, Kurlaender T. (2008). Incorporating youth-led community participatory research into school health center programs and policies. *Public Health Reports*, 123(6), 709-716.
6. Ballonoff A, **Soleimanpour S**, London J. (2006). Youth action for health through youth-led research. *Journal of Community Practice, 14(1/2)*. Published simultaneously in Youth Participation and Community Change, Eds. B. Checkoway & M. Gutierrez. New York, NY: Routledge, 2006.

BOOK CHAPTERS

1. **Soleimanpour S,** Brindis C. Children's health and health care policy: 1960s-present (2014). In Guide to U.S. Health and Health Care Policy, Ed. T. Oliver. Sag Harbor, NY: DWJ Books, LLC.
2. **Soleimanpour S.** School absences due to health conditions: Assessment. (2013). In Encyclopedia of School Health, Eds. D.C. Wiley & A.C. Cory. Thousand Oaks, CA: Sage Publications.
3. Geierstanger S, **Soleimanpour S.** School absences due to health conditions: Interventions. (2013). In Encyclopedia of School Health, Eds. D.C. Wiley & A.C. Cory. Thousand Oaks, CA: Sage Publications.
4. **Soleimanpour S**, Geierstanger S, Kaller S, McCarter V, Brindis C. (2011). The role of school health centers in health care access and client outcomes. In School-Based Health Care: Advancing Educational Success and Public Health, Eds. J.W. Richardson & T.D. Wright. Washington, DC: APHA Press.

PRESENTATIONS

1. **Soleimanpour S,** Lutsky M, Larsen-Fleming M, Brindis C. "Risk and resilience factors associated with frequency of school-based health center use." Annual Meeting of the American Public Health Association (APHA), Chicago, IL, October 31-November 4, 2015.
2. **Soleimanpour S,** Geierstanger S, Kaller S, Ng S, Lutsky M, McCarter V, Brindis C. "School-based health centers and adolescents' access to reproductive health care." APHA Annual Meeting, Chicago, IL, October 31-November 4, 2014.
3. **Soleimanpour S,** Lofink H. "Supports and barriers associated with the provision of health

care in schools: Results from a national census of school-based health centers." APHA Annual Meeting, New Orleans, LA, November 15-19, 2014.

4. **Soleimanpour S**, Geierstanger S. "Strategies for documenting school-based health centers' impacts on academic outcomes." School-Based Health Alliance Annual Convention, Seattle, WA, June 29 – July 2, 2014.
5. **Soleimanpour S**, Geierstanger S. "Making the case for school-based health center impacts on academic success." California School-Based Health Alliance Conference, Oakland, CA, March 7, 2014.
6. Lutsky M, Sakashita K, **Soleimanpour S**. "Efforts and indicators of health equity in Alameda County school health centers." National Assembly on School-Based Health Care (NASBHC) Annual Convention, Washington, DC, June 23 - 26, 2013.
7. Daggett CR, Geierstanger S, **Soleimanpour S**. "School-based health centers and educational outcomes: Current research and future directions." NASBHC Annual Convention, Albuquerque, NM, June 24 - 27, 2012.
8. **Soleimanpour S**, Ng S, McCarter V, Geierstanger S, Brindis C. "School-based behavioral health services in a diverse, urban setting: Making a difference." 139th APHA Annual Meeting, Washington, DC, October 29-November 2, 2011.
9. **Soleimanpour S**, Ng S, McCarter V, Geierstanger S, Brindis C. "Meeting the needs of Latino and African American youth: School-based behavioral health interventions." 139th APHA Annual Meeting, Washington, DC, October 29 - November 2, 2011.
10. **Soleimanpour S**, Ng S, McCarter V, Brindis C. "Traditional versus Centering: Which model of care leads to improved outcomes for Latina pregnant and parenting teens and their infants?" 138th APHA Annual Meeting, Denver, CO, November 6 - 10, 2010.
11. Kaller SK, Nguyen J, **Soleimanpour S**, Geierstanger S, Brindis C. "All I'm askin' is for a little respect: How schools and school health centers can promote violence-free schools." 138th APHA Annual Meeting, Denver, CO, November 6 - 10, 2010.
12. Geierstanger, S, Brindis C, **Soleimanpour S,** Faxio A. "A coalition of school-based health centers and key evaluation findings." 136th APHA Annual Meeting, San Diego, CA, October 25 - 29, 2008.
13. Faxio A, Geierstanger S, **Soleimanpour S**, Brindis C. "Useful and effective evaluation methodologies in the school-based health center setting." NASBHC Annual Convention, Los Angeles, CA, June 25 - 28, 2008.
14. **Soleimanpour S**, Kandawalla S, Bennett A. "Youth voice in school-based health centers: Student researchers informing programming and policy." NASBHC Annual Convention, Portland, Oregon, June 15-17, 2006.
15. Amaral G, Peterson S, **Soleimanpour S**, Brindis C. "Health care utilization behaviors of school-based health center users and non-users." 132nd APHA Annual Meeting, Atlanta, GA, November 6 - 10, 2004.
16. Amaral G, Peterson S, **Soleimanpour S**, Brindis C. "Meeting adolescents' needs for mental health services: How effectively do school-based health centers attract the students who need their services the most?" 132nd APHA Annual Meeting, Atlanta, GA, November 6 - 10, 2004.
17. **Soleimanpour S**, Peterson S, Brindis C, Ballonoff A. "Student research teams: Involving youth in school-based health center evaluation efforts." 132nd APHA Annual Meeting, Atlanta, GA, November 6 - 10, 2004.
18. **Soleimanpour S**, Peterson S, Brindis C, London J, Ballonoff A. "Student researchers: Impact of participation in youth-led health research projects on participants." 132nd APHA Annual Meeting, Atlanta, GA, November 6 - 10, 2004.
19. Ballonoff A, **Soleimanpour S**, Geierstanger S, Brindis C. "Integrating youth voice into school-based health center evaluations through youth-led evaluation." Annual Conference of the American Evaluation Association, Atlanta, GA, November 3 - 6, 2004.

20. **Soleimanpour S**, Brindis C. "Using evaluation data to manage programs." Bridge to Employment Alliance Building and Training Session, Academy for Educational Development, Washington, DC, November 2003.
21. Ballonoff A, **Soleimanpour S**. "Putting youth voice back into adolescent health programs through youth-led research, evaluation, and planning." Adolescent Health Conference, Oakland, California, May 6 - 7, 2004.
22. Peterson S, Amaral G, **Soleimanpour S**, Brindis C. "A comprehensive process and outcome evaluation: Implementation, results and lessons learned." NASBHC Annual Convention, Washington DC, June 25 - 28, 2003.
23. Brindis C, **Soleimanpour S**. "The impact of evaluation." Bridge to Employment Alliance Building and Training Session, Academy for Educational Development, Washington, DC, November 2002.
24. Peterson S, **Soleimanpour S**, Brindis C. "Adolescent school-based health centers meeting students' mental health needs." 130th APHA Annual Meeting, Atlanta, GA, November 9 - 13, 2001.
25. **Soleimanpour S**, McCarter V, Cagampang H, Brindis C, Shack K. "Making parental involvement in teen pregnancy prevention real: The Community Challenge Grant." 129th APHA Annual Meeting, Atlanta, GA, October 21 - 25, 2001.
26. **Soleimanpour S**, McCarter V, Cagampang H, Brindis C, Shah S, Shack K. "Culture matters: The effects of parental ethnicity on their attitudes towards sex education and adolescent sexual behavior." 129th APHA Annual Meeting, Atlanta, GA, October 21 - 25, 2001.
27. Knab S, Pomerantz K, Katta P, **Soleimanpour S**. "Students as change agents." 126th APHA Annual Meeting, Atlanta, GA, November 15 - 19, 1998.